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FOUNDED BY JAMES PLEASANT PARKER

INCORPORATING

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ANNALS
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INCORPORATING THE INDEX OF OTOLARYNGOLOGY.

VOL. XXIX. MARCH, 1920. No. 1.

I.

WALLING OFF THE SUBARACHNOID SPACES; ITS APPLICATION TO THE TREATMENT OF CEREBRAL AND CEREBELLAR ABSCESS OF OTITIC ORIGIN, AND, IN A GENERAL WAY, TO THE SURGERY OF THE BRAIN.*

BY FERNAND LEMAITRE, M. D.,

PARIS.

Every endocranial operation comprises three stages:

First stage—From the skin to the outer surface of the dura mater. This is the process of trepanation, properly so called, and is a simple operation, with little risk.

Second stage—From the outer surface of the dura to the cerebral cortex. The easy operation of traversing the meninges is, classically, a simple incision of the membranes, but it becomes an extremely dangerous intervention because of the results which it connotes, such as meningitis and cerebral hernia.

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*Translated by A. Miller, M. D.

Third stage—From the encephalic cortex to the point in the cerebrum or cerebellum which it is desired to reach. This is properly an encephalic operation, variable according to the object to be attained—drainage of an abscess, search for a foreign body, removal of a tumor, etc.—always delicate and serious, but of a gravity which cannot be compared to that of the second stage.

In resumé, uncovering the dura mater is of no consequence; it is done often and without danger in the course of a simple mastoid trepanation. Operation on the encephalon is relatively benign; the tolerance of the organ, shown by the harmlessness of exploratory puncture, appears also to be confirmed by the history of many war wounds of the cerebrum and cerebellum. But passing the meningeal barrier is an eminently dangerous thing.

We can say that brain surgery owes its gravity to the existence of the meninges, or, more exactly, to the subarachnoid spaces, by suppressing this, the prognosis becomes very different.

Now, this suppression, this walling off, the surgeon can obtain and profit thereby either by producing it (induced exclusion) or by utilizing preformed adhesions (spontaneous exclusion).

Induced Exclusion.—The surgeon may, at the chosen point, transform the meninges into a fibrous coat in the following manner:

For clarity of exposition and because of the frequency of the condition, let us suppose that we are dealing with an encephalic collection of otitic origin, which we propose to find and treat.

The meninges being exposed, we employ the following technic: In no case and under no pretext do we cut the meninges nor use the scalpel. A stout Pravaz needle, a grooved director, a small forceps with smooth jaws (the angled forceps of the otologist, for example) and a filiform drain constitute our entire surgical equipment.

The Pravaz needle is pushed through the meninges and into the brain in the supposed vicinity of the collection. When a drop of pus escapes through the needle, indicating that its point is in the abscess, the needle is replaced by a grooved director introduced along the needle and thus slightly enlarging the opening. Most often pus appears in the groove and the abscess is thus partially evacuated. A drain of very small caliber, almost filiform, is then introduced, with the bent forceps mentioned, along the channel of the director and without tearing the meningeal breach. It is not necessary to fasten the drain, for, contrary to what happens in most drainage cases, it is never expelled. The drain is left in place twenty-four to forty-eight hours. In time it acts, not as a drain, but as an irritating foreign body, tending to create meningeal adhesions. In fact, the meninges about it are changed to a fibrous covering, as we have found constantly in the five cured cases later described and carefully examined at autopsy.

Next day, or on the second day after, at the first dressing the opening may be enlarged. This can be done in different ways: a drain slightly larger than the first can be introduced, or, with a very fine bistoury, the fibrous ring about the drain can be incised for one or two millimeters, carefully avoiding going beyond the transformed area in the meninges. Into the breach thus made, which, let it be repeated, must not go outside the fibrous thickening, a drain of desired caliber is then introduced. The latter then begins to play its rôle, not only of drainage but also that of a foreign irritant about which and for some distance away the meninges undergo a fibrous change. Every day, for upwards of a week, the dressing is repeated in the same manner. A drain of larger and larger size is put in, which enlarges the meningeal opening, increases the fibrous area and thus gradually removes the arachnoid spaces from the drainage channel.

When the channel measures six or seven millimeters in diameter the patient can be considered well on the way to cure. There remains only to watch the drainage of the abscess.[1]

By this technic we avoid the two great complications, both frequent and dangerous, which we nearly always have after incision of the meninges, namely, meningitis and hernia. Meningitis is prevented by the same process by which general peritonitis is averted in a case of appendicular abscess. The pus from a brain abscess is drained without invading the meninges the same as the pus from the appendix has been drained without involving the peritoneum. Walling off the arachnoid spaces is like walling off the greater peritoneal cavity, excepting, of course, that the exclusion of the peritoneum is spontaneous while that of the meninges is induced.

As to cerebral or cerebellar hernia, it cannot ensue, because the brain, instead of finding an opening, meets a barrier, and that a reënforced one.

A patient with a cerebellar abscess treated in this way, who died of a second cerebellar abscess developing after the first was progressing to a cure, has furnished us with proof. In this case at autopsy the existence was clearly shown of a dense, resistant ring about the drain, and beyond the ring the microscope revealed nothing.

Following are five cases of brain abscess of otitic origin which we have treated by this method, all of which resulted in a cure. In the first, which is described in detail, there was a cerebellar abscess resulting from a suppurating otitis media of traumatic origin, and the operative technic described was employed. The patient was also looked after from a neurologic viewpoint by my friend, Tournay, and it is intended to present the case before the Neurologic Society. The four other cases, given in brief, were at the Lariboisiere, where I had the honor of substituting for my chief, Dr. Sebileau.

CASE 1.—CEREBELLAR ABSCESS DUE TO TRAUMATIC SUPPURATIVE OTITIS MEDIA—CURE.

The patient, Private B. C., of the 104th Inf., was wounded November 5, 1916, at Douaumont by a shell bursting fifty meters to his right, producing a tympanic rupture. Middle ear suppuration followed, then mastoiditis, for which a trepanation was done December 5th. On January 14, 1917, he came to the otolaryngologic center at Vichy, with the following notation: "Copious suppuraiton from the mastoid wound; osteitis of the antrum." On February 4th I was called in consultation by the chief of the center, Chouquet, who suspected a brain lesion because of the following symptoms: Headache, vomiting, slight cerebral torpor, papillary stasis, pulse 50 to 60, temperature varying from 37.7° to 38.2° C., exaggerated reflexes, especially on the right (the side of the presumed lesion), plantar reflex marked in extension, nystagmus on looking obliquely, and slight vertigo. When asked to touch the tip of his nose with his index finger he did not execute the movement properly with his right hand. Socalled "marionette" movements were also difficult for the right hand. With these symptoms present, I confirmed the diagnosis of a brain collection and thought of a cerebellar abscess.

Operation was done the same day and following are the notes: The bone lesions were very extensive, necessitating resection of the antral roof and exposing the sinus in its entire vertical portion as well as the brain in front of and behind the sinus. Three punctures with the Pravaz syringe were made posterior to the sinus. The first, pushed to a depth of 3.5 centimeters, brought only thick, reddish cerebrospinal fluid. Another puncture of the cerebrum resulted only in fluid of a very slightly altered appearance. Again the cerebellum was punctured, but this time in front of the sinus. The needle had hardly penetrated to 2.5 centimeters depth when a drop of pus came from the free end.

Through the puncture an aurist's forceps with smooth jaws slightly opened was then introduced, permitting the evacuation of a liquor glass full of clear reddish yellow pus.

A very small drain was passed with slight difficulty through the meningeal opening immediately in front of the lateral sinus.

Bacteriologic examination of the pus by Dr. Demoulieres gave the following:

Fluid from the cerebral puncture, sterile. Fluid from the cerebellar punctures, in front of and behind the sinus, streptococci in pure culture.

First dressing February 6th. Dressing removed with escape of a spoonful of reddish purulent fluid under pressure. A drain of slightly larger caliber was introduced with great difficulty.

Neurologic examination by Dr. Tournay: Tendon reflexes of lower limbs slightly greater on right, especially the patellar. Extension of the big toe to the right. Fibrillary twitching on the right. Upper limbs: Dyssymmetry of right arm.

February 7th, second dressing: Immediately on removing the drain reddish fluid, then frank pus issued from the cavity. Insertion of a slightly larger drain. The meninges about the drain did not yet show any tendency to fibrosis. However, there was no meningeal reaction nor any tendency to hernia. The vomiting, which disappeared after operation, has given place to a slight nausea.

February 8th, third dressing: The size of the drain was slightly increased.

February 9th: The ordinary rubber drain was replaced by a fenestrated hard rubber drain specially made in the prosthetic laboratory by Dr. Bennajeant.

Neurologic examination: No change since the previous examination, although it is evident that the right forearm reflex is stronger than the left. Babinski's sign is marked. The right hypermetry is easily demonstrated both for the upper and lower limbs. When commanded to touch the tip of his nose with his index finger the patient quickly points to his left eye, passes beyond the root of the nose, then slowing his movement with evident effort he finally and hesitatingly touches the nasal tip. Likewise when told to put his right heel quickly on his left knee he carries it up to the anterior surface of the thigh to a hand's breadth below the hip joint, then slowing his movement in a second effort he brings his heel to the knee.

In the "index test," when the patient executes horizontal movements, he shows a marked tendency to spontaneous deviation downward. This deviation is not seen on movement in the sagittal or frontal plane.

February 10th, fifth dressing: The vulcanite drain has been well borne. After cleansing, it is replaced and pushed in deeper, allowing thick yellowish pus to escape. There was probably a still deeper collection which the drain thus reached and permitted to evacuate.

February 11th, sixth dressing: Locally, the appearance of the wound is very satisfactory. The fibrous, meningeal, walling off ring is perfectly established. However, the headache and vomiting have reappeared.

February 12th, seventh dressing: Contact of the drain with the anterior wall of the sinus has undoubtedly caused an erosion of the latter. Extraction of the drain caused a copious hemorrhage. The sinus was tamponed, no drain.

Neurologic examination showed no change of symptoms, save in the "index test." When the right upper arm performed movements in the horizontal plane the index deviated downward, as in the preceding test, the deviation amounting to 25 centimeters. Moreover, in movements in the sagittal plane the finger deviated to the right, which it did not do in the previous trial, the deviation being 25 centimeters. There was never any deviation in the frontal plane.

February 15th, 16th and 17th, tenth, eleventh and twelfth dressings: Local conditions quite satisfactory. Drainage perfect. The mastoid wound shows a tendency to fill too rapidly, and a compressing dressing was applied to it. The patient declares that on certain efforts, in particular when he attempts to pass gas, he feels vertiginous sensations; seeming to him as though he were turned on his feet like the hands of a watch, the left shoulder being carried forward

February 18th, 19th, 20th, thirteenth, fourteenth and fifteenth dressings: The granulation of the abscess cavity tends to expel the drain. The latter is replaced by another vulcanite tube, shorter but longer. The general condition is good. Only the vomiting persists and this seems to be due to irritation of the vestibular passage (Deiter's nucleus) rather than to the cerebellar abscess itself.

Neurologic examination indicates an attenuation of the signs of pyramid irrittaion (tremor) and certain cerebellar symptoms. The index test in the vertical plane with the entire arm still shows deviation downward of 25 centimeters. But there is no deviation when he uses only his hand. Besides, there is no deviation in the horizontal plane. Nystagmus, on the contrary, is more marked. The oculocardiac reflex is slightly exaggerated (22 to 50).

February 26th, daily dressing is continued: Suppuration has diminished considerably. Granulation has reduced the length of the drain to 1/5 centimeter, but not its caliber. No vomiting for two days. General condition excellent. Neurologic examination shows change. Reflexes are almost normal. Plantar irritation sometimes, but not always, elicits extension. As to the cerebellar symptoms, they are reduced to a slight vertigo.

March 5th. No dressing for thirty-six hours. The drain has been expelled. Only a simple mastoid dressing is applied, but taking care to put the end of the wick in the little cavity of the meningeal layer, the granulation of which is fusing with the granulation of the mastoid wound.

March 16th. Curettage of the exuberant granulations of the mastoid which tend to hide the deeper granulations over the cerebellum. The cerebral cavity is entirely filled.

HEARING TESTS.

Right		Left
0.4	Voice	2. M.
0.12	Whisper	0.25
Contact		0.05
0.20	Watch	0.20
Positive	Rinné	Positive
....	Weber	Lateralized
Markedly diminished	Schwabach	Diminished

VESTIBULAR TESTS.

Nystagmuh caloric reflex (water at about 20 degrees C.), normal on both sides.

Rotary nystagmus reflex (10 turns in 20 seconds) abolished on the right, normal on the left. Voltaic vertigo: Positive on the right, beginning of inclination at 4 m. a. Positive on the left with backward traction at 10 m. a.

April 22d. Both from the general and local viewpoints the patient may be considered cured. He is sent on for convalescence.

February 20, 1918. Twelve and a half months after operation he shows no pathologic signs other than slight intermittent headache, tinnitus in the right ear, with marked diminution of hearing on this side, and abolition of the right rotatory nystagmus reflex, while the caloric reflex is retained. Private B. was then recommended for the Auxiliary Service.

CASE II.—ABSCESS OF RIGHT TEMPORAL LOBE FOLLOWING CHRONIC OTORRHEA. RECOVERY.

This was a woman, Eugenia M., aged 26. August 15, 1911, she was admitted to the service of Dr. Sebileau, whom I replaced. She was in coma and her history, taken previously, was as follows:

Anamnesis: Chronic (?) otorrhea dating from infancy, recurring three years ago, subsiding, then recurring again four weeks ago. About July 20th the patient, who was near the end of pregnancy, began to have extremely violent headache. The headache, which was temporal and bilateral, did not respond to analgesics and was so severe that it prevented sleep. Accouchment of her child, a healthy full term boy, took place July 31, spontaneously and normally. August 11, the patient left the midwife's sanitarium and went home. The headache, which had never ceased to be violent during this period, increased still more. August 15 the patient, in coma, was taken to the Lariboisiere.

Sympotms on entry: On the morning of the 16th when I examined her the coma was absolute. There was a marked deviation of the head and eyes to the left, contraction of all four limbs, distinct exaggeration of all the reflexes and fibrillary twitching of the right arm. Respiration was stertorous and the tongue dry. The pulse was slow (60), but varied from moment to moment. Temperature 38°. No reaction of a meningeal character, except the Kernig sign. Lumbar puncture showed numerous polynuclears and a few lymphocytes but no microbes in the fluid. Immediate intervention was determined upon.

Operation.—Under chloroform anesthesia a classic opening of the petromastoid was made. In the vicinity of the antral roof and the tympanic cavity at least two centimeters of the dura mater was covered with granulations. With the Pravaz needle the temporal lobe was punctured immediately, causing an issue of fetid yellowish serous pus; on being examined it was found to contain many cocci—staphylococci and some chains of streptococci. The grooved director was introduced into the meningeal wound and the pus flowed through the groove. Then a small drain replaced the director. No plastic. Dressing with gauze and zinc peroxid. The pulse, which was 55 at the beginning of the operation, rose to 94 after, but the patient remained in coma for 18 hours.

Operative Results.—On the evening of August 17 the patient responded to questions and insistently demanded food and drink.

August 18 (24 hours after operation) the cerebral condition was normal and her lucidity was such that the anamnesis above related was obtained. Contractures had disappeared and the limbs were supple, only a slight stiffness of the neck remaining. Violent frontal headache was complained of by the patient. From this time on dressings were changed daily. For a week the size of the drain was increased a little every day in order to increase the meningeal breach gently and progressively; its borders took on a fibrous consistency on the fourth day.

For three weeks variations of temperature and pulse were noted. Changes in her general condition were in proportion to the greater or lesser efficiency of the drainage. Every time that we attempted to abolish the drain the temperature mounted, the pulse slowed, and the headache reappeared.

September 9, the flow having ceased and the cavity being partially filled, the drain was discontinued. Her condition was such that she began to sit up.

September 21, a plastic was done under chloroform. Thereafter the dressing was applied through the canal.

November 15 she left the hospital, having had no complication other than a mild chrondritis due to bacillus pyocyaneus.

February 24, after 43 dressings, the wound was completely epidermized.

For a period of two years I saw the patient from time to time. During this time she had three attacks with the following symptoms: Violent headache for two or three days, then for 24 to 36 hours a continuous discharge of cephalorachidian fluid which apparently came from the old meningeal wound, then a sudden stoppage of the discharge and return to normal.

CASE III.—ABSCESS OF THE TEMPORAL LOBE FOLLOWING ACUTE OTITIS MEDIA. RECOVERY.

Mme. T. H., aged 25, entered the Lariboisiere November 2, 1911. She was four months pregnant. No previous history. Questioning the patient was difficult, however she made it understood that for a fortnight she had suffered with her left ear, having tinnitus and deafness, and for about a week her ear had been suppurating. It was also learned from her story that for several days preceding admission she had been stuporous, the hebetude going on to attacks of mild delirium, although between attacks she recognized persons and things without being able to name them. In addition there were frequent vomiting, very intense, left hemicrania and persistent insomnia. The hemicrania necessitated topical applications, effects of which, such as blisters and crusts, could be observed on the left frontal and temporal regions.

These phenomena have rather lessened during the past three days; the headache has become less intense and the hebetude less marked. November 2, when examined on entry, she showed marked mental trouble. She manifested both cerebral stupor and paraphasia. Either she gave a meaningless name to things that were shown her or she erred in their appellation. Most objects she called "plate" (assiette) and realizing that she was wrong, grew impatient. If the object was named for her, she repeated the word but by her manner showed her doubt of the name announced. There was no verbal deafness. On the other hand, there was a slight dysgraphia; she wrote at dictation with numerous errors and soon stopped, showing great fatigue. The word-blindness was more evident; in copying a text she made many mistakes and changed the words until they were unrecognizable. She spelled fairly well but read with greater difficulty.

Reflexes: The right patellar reflex was plainly exaggerated, and the Babinsky positive on this side. No signs of meningeal reaction.

As to the eyes, the pupils were normal, no nystagmus, no motor paralysis, fundus not examined.

Locally there was a slight discharge of thick pus from the ear. The posterosuperior canal wall was bulged so that the drum membrane could not be seen. No external changes over the mastoid; it was tender to pressure, especially over the antrum. Percussion was painful in this region, also in the frontal and temporoparietal regions. Temperature, 38.2° C.; pulse, 80; respiration, normal; no albuminuria.

Operation, November 4.—Classic mastoid trepanation. Pus under tension was found in the antrum. There was a marked osteitis about the canal of the facial, which was almost totally destroyed, of the tip, which was resected, and of the antral roof, which no longer existed. At this latter point the dura was red and granulating. During the night following the operation the patient had two attacks of Jacksonian epilepsy.

November 5. The patient was very restless, the cerebral symptoms were more marked, and it was decided to go through the meninges. Near where the antral roof had been the opening through the bone was enlarged and with the Pravaz needle three punctures were made in the cerebrum. The one farthest anterior, which corresponded to the anterior portion of the sphenotemporal lobe, under slight pressure brought some very fetid brownish pus. The grooved director was introduced in the meningeal wound, distending it. Pus came out the groove. Then the director was replaced by a filiform drain 3 c. m. long. In the evening the temperature remained high (40° C.), the patient was delirious and the facial expression was changed. November 6 the temperature was 37° C., the general condition was less disquieting and the patient spoke. From this time on the cerebral phenomena and general symptoms diminished and rapidly disappeared. For two weeks the dressing was changed every day. At the beginnig the drain was changed daily and increased in size until it reached a caliber of 25. A few times the cavity was lavaged with boiled water with a little hydrogen dioxid added. Little by little the drain was shortened without changing its diameter, and on February 17, after 29 dressings, the patient, who had long before left the hospital, was well. I saw her six months afterward. Her accouchment had taken place normally.

CASE IV.—ABSCESS OF LEFT FRONTAL LOBE OF OTITIC ORIGIN. RECOVERY.

A young man of 37, a government representative, in the course of an acute suppurative otitis, developed an abscess of the left sphenotemporal lobe.

During the early period of the trouble its evolution was that of a simple mastoiditis, and only one symptom, persistent headache, aroused fear of a complication.

In the second period, which began three weeks after mastoid trepanation, two groups of symptoms appeared. In one group there were slight signs of meningeal reaction—stiffness of the neck, Kernig—and in the other there were signs of involvement of the left temporal lobe—paraphasia and word-blindness. Papillary stasis directed the diagnosis plainly to an encephalic collection.

Operation was performed as in the preceding case, applying in still more systematic fashion the method described of walling off the meninges. It should be noted that the abscess was superficial, its internal limit being 3.5 cm. from the cortex and its external wall only 6 or 7 cm. from the meninges. This condition explains the very slight signs of meningeal reaction observed and the aseptic character of the cerebrospinal fluid. Cure took place in five weeks, dating from the second operation, by granulation of the abscess cavity and mastoid wound. Contrary to the preceding case, the paraphasia went away very slowly, being the last symptom to disappear.

CASE V.—ABSCESS OF RIGHT TEMPORAL LOBE FOLLOWING CHRONIC RECURRING OTORRHEA. CURE.

(Résumé of a report to the Surgical Society, December 16, 1912, by Sebileau.)

The patient, a young farm laborer, aged 20, having chronic otorrhea with recurring suppuration, entered the Lariboisiere with the following symptoms: Old right otorrhea, with abundant and very fetid suppuration, slight mastoid reaction, headache, vomiting, slowing of pulse and slight fever.

Operation was done in two stages. On opening the mastoid there was found an osteitis of the antral roof. After this the symptoms persisted except that the headache was less. The abscess was found by exploration with the Pravaz needle introduced through what had been the roof of the antrum into the right temporal lobe. At a depth of 3.5 cm. a brownish, somewhat thick fluid escaped, which on bacteriologic examination showed the presence of bacillus pyocyaneus. A drain 1 mm. in diameter and 4 cm. long was introduced.

Operative Results.—No meningeal reaction, no tendency to hernia. The pus was evacuated through hard rubber fenestrated drains with progressively increasing caliber. The cerebral abscess healed in four weeks without any sequelæ. The wound, on which a secondary plastic was done, was cicatrized in three and a half months.

Six months after leaving the hospital the patient wrote from St. Quentin, where he resided, that nothing in his condition recalled his former trouble.

CEREBRAL COLLECTIONS FOLLOWING WAR WOUNDS.

This method of walling off the subarachnoid spaces for brain abscesses of otitic origin I have also applied to cerebral collections following war wounds.

For the moment we shall discuss the purely encephalic closed collections and not those with fistulæ and meningeal changes.

In such cases we proceed exactly as in brain abscess originating from the ear. The same technic gives the same results. But here there is a new, element—spicules, bits of clothing or various foreign bodies enclosed in the abscess cavity or near it. These tend to provoke exacerbations or recurrences. They modify both the method of drainage and the eventual prognosis, because they are capable of causing the death of an apparently cured patient. In spite of all this, the principle of walling off the subarachnoid spaces remains absolute, since it always averts meningitis and hernia of the brain.

For example, here in the case of a cerebellar abscess in which the patient left our service perfectly cicatrized and apparently normal, yet died, it appears, five or six months after the operation of an unknown affection, no doubt a recurrence.

CASE VI.—ABSCESS OF CEREBELLUM OF TRAUMATIC ORIGIN.

Private D. was wounded at Hill 304, May 27, 1916, by a bursting shell, near the right occipital region. The projectile was extracted in the ambulance. During the following days the patient showed marked agitation; lumbar puncture yielded hemolyzed fluid.

June 4 trepanation showed that there was a depression of the skull for about 2 cm. in the inferior occipital region near the median line. Some spiculæ were extracted and, the dura mater being adjudged intact, the operator used only a gauze drain. Soon there appeared vomiting of water and bile, considered to be of gastric rather than cerebral origin.

June 30, the wounded man arrived at the Otorhinolaryngolic Center. At this time and for six weeks he had no symptoms on which a precise diagnosis could be made. There were only a slowing of the pulse to 55, infrequent vomiting with no particular character, a state of depression rather than somnolence, and vertigo which obliged the patient to stay in bed. About August 20 the symptoms became more definite; the vomiting was more frequent, the occipital headache was paroxysmal, the pulse, always slow, especially when the patient slept, became small, frequent and filiform when he performed any movements.

This condition continued until September 15. On that date there was an exaggeration of the reflexes, mild on the left, marked on the right. The right side showed clonus and Babinski. No nystagmus, no adiadococynesis. Examination of the oculæ fundi indicated bilateral papillary stasis.

Operation, September 18: Occipitonuchal incision, in the path of the original cut. The trepanation opening was enlarged. The dura mater showed adhesions to the integument in the trephined area and to the bone in its lower portion. Attempt was made to separate the adhesions from the cerebellum, and this seemed to cause a marked bulging of the ecrebellum. A Pravaz needle introduced into this bulge brought a teaspoonful of yellowish pus which microscopically showed streptococci. A very small sized drain was introduced through the meningeal breach to a depth of 3 cm. An opening was made in the skin covering to correspond with the opening in the bone, in order to permit drainage and observation of the wound.

Operative Results.—Almost immediately there was a disappearance of the vomiting, diminution of the headache and return of the reflexes to normal. The caliber of the drain was increased after the first dressing and its length was lessened after the twelfth dressing. The existence of the fibrous exclusion ring was noted on the fourth day. At no time was any tendency to hernia noted. In the first days the drain did not drain; it simply performed its work of exclusion, and the pus was evacuated each morning on withdrawing the drain. A cotton carrier put in to a depth of 3.5 c. m. brought out the pus which was not spontaneously expelled.

October 10, the patient was able to get up. November 28 the drain was abolished. December 15, the wound was completely cicatrized. March 30, the patient showed no symptoms other than a slight exaggeration of the rotation reflex. He was considered cured and sent to convalescence.

We learned in June that he had died suddenly.

FOREIGN BODIES IN THE BRAIN.

Finally, with regard to artificial walling off of the subarachnoid spaces, I would say that this method applies to the extraction of war projectiles from the brain, whether the extraction be through healthy meninges or meninges that have regained a normal appearance objectively. Removal of the projectile is done in two stages: the first or preparatory stage being the walling off, and the second being the extraction proper through the walled off membranes.

CASE VII.—BIT OF SHELL ONE CENTIMETER SQUARE IN THE RIGHT CEREBRAL HEMISPHERE THREE YEARS; EPILEPTIFORM CRISES. REMOVAL AFTER WALLING OFF THE MENINGES. RECOVERY.

Private G. P., of the 159th Regt., Infantry, was wounded September 10, 1914, by a bursting shell. A double trepanation was done, one over the posterior, the other over the inferior portion of the left parietal region, but the foreign body was not extracted.

In May, 1915, the patient, whose wound had healed, but who had epileptiform crises was discharged.

April 27, 1918, the epileptiform crises had become increasingly frequent and he was hospitalized at the Vichy neurologic center.

Examination: Headache, right hemiparesis, with exaggeration of reflexes, right plantar extension reflex, frequent attacks of Jacksonian epilepsy. By radiography the projectile was localized not far from the upper end of the Rolandic area and its extraction advised.

First operation, April 30, 1918, for exclusion of the subarachnoid spaces. Under local anesthesia with adrenalized novocain, 1/200, the anterior superior trepanation was enlarged with bone forceps. In this region the meninges appeared to be covered with a thin layer of fibrous tissue, but at the periphery where they were freshly exposed they appeared normal. With a fine trocar the meninges were punctured, and under the guidance of the fluoroscopic screen the instrument was directer toward the projectile. It should be stated that the insertion was made slightly below the foreign body to avoid the lateral sinus and slightly behind to avoid the upper part of the Rolandic zone, making the path of the trocar somewhat oblique. The trocar was replaced by a 3 mm. drain.

April 5. Drain of 5 mm. inserted.

April 7. A fibrous ring is seen about the drain, whose caliber is now 7 m. m.

April 8. Drain of 8 mm. diameter. Meningeal changes about the drain are very plain.

April 9. Drain of 9 mm.

April 11. Second Operation.—Local anesthesia; intermittent employment of fluoroscope. A metal tube, specially made in my workshop, was introduced through the meningeal opening. The tube thus served actually as an encephaloscope. Dr. Surrel, who managed the fluoroscope, announced the relations between the end of the tube and the missile. I attained contact with the projectile after breaking a path and making a real endoscopy of the brain by means of a head mirror.

Nevertheless I did not discover the projectile at the moment when Dr. Surrel stated that the tube was in contact with it, because there was a capsule surrounding the projectile sufficiently dense to hide it from plain view but thin enough to locate it by the transparency on closer examination. The capsule was broken by a cotton carrier, and under direct vision the foreign body could be moved slightly. Then with a foreign body forceps from our bronchoesophagoscopic kit I seized the missile and brought it out together with the encephaloscope.

The operative results were simply those of a cerebral abscess with scanty thin pus, containing staphylococci and a few tetragenes; healing occurred in five weeks.

Cicatrization was accomplished by granulations that expelled the drain which was slowly shortened but increased in caliber.

It should be stated that during the first five or six dressings the insertion and extraction of the drain and especially the introduction of a cotton carrier, produced limited epileptic crises without loss of consciousness the same as he had had and feared before, following the same modality but not with as great intensity. On the right there would be clonic contraction, then successively tonic contraction of the finger, hand, all of the upper limb, finally of the face, and sometimes also the leg. Twice the attack was generalized and was then accompanied by loss of consciousness. Each time the pupils dilated considerably just before the attack began.

June 5, the patient was sent out. The wound was well cicatrized. Since extraction of the projectile there had been no epileptic attacks except those produced by the act of dressing. A little headache and left hemiparesis persisted.

CASE VIII.—FOREIGN BODY IN THE LEFT FRONTAL LOBE DUE TO A BURSTING AIR SHELL. DEATH.

M. R., of the 53rd Regt. Colonial Infantry, was wounded October 1, 1917, at Ravigny. He was admitted to the Center October 12, and presented a penetrating wound immediately above the right zygomatic arch, into which the probe penetrated 8 c. m. on directing it toward the top of the orbit. At this point the probe discovered denuded bone, moreover a radiograph indicated the presence of a metallic body 6 or 7 mm. square behind the left frontal sinus in the area of the left frontal lobe.

Ophthalmologic Examination.—O. S.: Almost complete ophthalmoplegia. Pupil immobile in mydriasis. Vessels and papilla apparently normal. Macular hemorrhage. Vision = light perception. O. D.: Normal.

Neurologic examination: Negative.

October 15. Operation with the object of walling off the meninges which would ultimately permit extraction of the projectile. This was done under fluoroscopic control. When the frontal sinus was trephined and its posterior wall removed the meninges seemed objectively normal. The fluoroscopic screen showed that the projectile was situated 4 or 5 mm. internal to the meninges as indicated by a probe placed in contact with them. The meninges and brain were punctured with a fine trocar. The screen showed contact of the trocar with the foreign body at the same time that the operator felt metallic contact.

A small drain was introduced into the punctured opening. October 17, the drain was removed, followed by the escape of cerebrospinal fluid; it seemed that adhesions had not been set up. A drain of 3 m. m. diameter replaced its predecessor. October 19, there was no escape of fluid on taking out the drain. This time the meninges seemed to have reacted and a drain of 5 mm. was put in with difficulty. October 21, a fibrous ring was plainly in evidence; drain of 7 mm. October 23, second operation, extraction of the projectile. This was done under local anesthesia with screen control. The projectile was brought out to the meningeal opening with a curette and seized with a forceps. Accompanying it was a scale of bone from the entry wound which had been carried in by the missile.

Operative Results.—For three days the local evolution was normal, the meninges organized in the usual way. October 27, fever appeared, with slight delirium and signs of encephalitis. These symptoms continued to aggravate and the discordance between the local and general conditions was striking. November 21 the patient died. Autopsy showed a frank circumscribed encephalitis and meningitis of the right hemisphere almost exclusively, the left frontal lobe, on the contrary, presenting a cerebral wound in process of granulation with normal meningeal adhesions about the drain. To sum up, the patient died of right cerebral lesions developed from the wound of entry and the first part of its intrahemispheric path.

SPONTANEOUS EXCLUSION.

By way of summary, what do we accomplish by inducing a subarachnoid walling off? Simply that we obtain at will the course usual in a septic meningitis progressing to a cure and ending in a subarachnoid exclusion. The conception of this spontaneous exclusion I have acquired from the practice of otology. An old principle of aurists demands that the procedure in the course of operation for mastoiditis complicated with intracranial lesions shall follow the path of infection—"follow up the lesions," as they say. Now we should remember that, however empirical this principle may seem, it has been demonstrated by experience as being perfectly valid. In fact, it is undeniable that an abscess of the temporosphenoidal lobe heals more often when it is opened by way of the tegmen tympani or antral roof than when it is attacked through the temporal fossa. No doubt it is because by following the former path we go through meninges which though of course not completely excluded have nevertheless formed some adhesions, while in following the temporal route we attack normal meninges, without defensive organization, and thus are taken at a disadvantage. But these considerations are somewhat theoretical and consist partly of hypothesis. The example furnished by the shirt button abscess, "en bouton de chemise," is even more convincing. The literature reports some cases of brain abscess which eventualy drained themselves externally. It is logical to suppose that in these cases the pus could not have been evacuated except through meninges organized against the infection. Moreover, in a case of this sort I have just verified anatomically the correctness of this assertion; at autopsy I found an old cerebral abscess emptying into a mastoid (which was itself fistulous) through a meningeal breach the circumference of which constituted an actual fibrous ring.

Here then are positive facts gathered from war surgery which bring support to our theory and I think have striking value. War surgery has allowed us to observe many cases of brain wounds proving that every meningeal injury, if the evolution of an infectious process is not too overwhelming, reacts by forming adhesions which completely exclude the subarachnoid spaces.

These facts are noted in: Traumatic cerebral collections. Foreign bodies in the brain. Brain wounds with or without hernia.

CEREBRAL COLLECTIONS FOLLOWING WAR WOUNDS.

When the brain is injured by a projectile it is most often accompanied by foreign substances, such as spicules from the cranial vault, bits of clothing, hair, etc., which cause suppuration. Certainly, it is possible for the meninges to cicatrize normally and the cerebral collection thus to be closed. We have beheld such an instance as described previously and have shown that in treating this kind of suppuration it is necessary first to exclude the subarachnoid spaces.

But most often the meninges do not close; they organize and we have a fistulous cerebral abscess; actually a "shirt button abscess" has thus been created.

Following are three cases of this sort in which new formed adhesions existed about the fistula; the adhesions being scrupulously respected were reinforced and extended by the employment of a sufficiently large drain just the same as in artificial exclusion. In this way the case becomes similar in all respects to one of artificial walling off and the same technic is applied.

In the first case the fibrous exclusion ring was perfectly recognizable. In the third case it should be mentioned among other things that when we operated, the meninges, which had been widely opened by the projectile, had not undergone the fibrous process and consequently did not occasion sufficient resistance to the outward push of the brain. The cerebral hernia become more accentuated up to the moment that the drain provoked fibrous changes; after the formation of this barrier the hernia persisted but did not increase.

The second case is no less striking in respect of the production of a fibrous ring. When by the employment of drains graduated in caliber the diameter of the ring became sufficiently large, two or three spicules of bone came out of the abscess cavity. Eventually it was neecssary to take out two more which were deeply situated. After their extraction the wound cicatrized normally.

CASE IX.—FISTULOUS CEREBRAL ABSCESS OF TRAUMATIC ORIGIN, PROGRESSING TOWARD RECOVERY.

Corporal C. M. was wounded June 16, 1918, by an air bomb at Oguon. He sustained a small cranial wound and a large wound in the masseteric region with a Y-shaped fracture of the lower jaw on the left side. The latter received most attention. However, on September 21, the cranial wound not cicatrizing and suppuration persisting, the fistula was explored. Nothing abnormal was found. The bone did not seem necrotic and the meninges seemed healthy; the edges of the skin wound were excised and the wound sutured.

October 22, the patient was shown to me. I noted simply a rather abundant suppuration from the fistula which had recurred and a headache which varied according to the purulent discharge. Neurologic examination revealed neither motor nor sensory trouble of cerebral origin; patellar and Achilles reflexes equal, plantar flexion; pupils equal with normal reaction; visual field normal; fundus normal.

October 23, operation. Local anesthesia with adrenalized novocain, 1/200. Exploration of the fistulous tract after making a circular flap over the frontotemporal region and detaching some anterior fibers of the temporal muscle. There were found:

1. Fungosities in the bony opening (size of 50 centime piece) produced by the traumatism.

2. After enlarging the opening, the existence of a small meningeal track about which adhesions had formed, thus accomplishing a spontaneous exclusion of the meningeal cavity.

3. A pocket of pus with its bottom 4 cm. from the cortex. A drain of small size was introduced forcibly into the fistula; it served both for drainage and for the walling off process.

An opening was made in the center of the flap, which was then put in place and sutured.

October 25, the point had been gradually reached where it became possible to introduce a drain of 8 mm. diameter. Headache had disappeared. No longer was there any pus retention, the cerebral pulsation, which was well marked, having aided in evacuating the collection.

November 13, examination of the cavity with the encephaloscope showed that it was beginning to fill by granulation.

December 10, progress was slow but normal. The pus was less and less abundant, and the drains, though slightly augmented in caliber, were progressively shortened.

CASE X.—PENETRATING WOUND OF THE RIGHT FRONTOPARIETAL REGION; FISTULOUS ABSCESS, RECURRING BECAUSE OF SPICULAE; RECOVERY.

Adjutant V. was wounded by a shell May 17, 1916, at Hill 304. He was trephined May 19 for a "penetrating wound of the skull with tearing of the meninges and escape of brain substance." He arrived at the Royat Center June 13, 1916. On admission he complained of intermittent headache and vertigo. The operation wound had healed save in its lower portion, where there was fairly abundant pus. During the following days the headache and vertigo increased in intensity and the suppuration was greater. There were noted papillary stasis, exaggeration of the Achilles and patellar reflexes on the left, and Babinski on this side. Radiography showed a projectile 3 or 4 millimeters in size, situated near the internal aspect of the right hemisphere, quite near the median line, at the intersection of a vertical line through the middle of the sella turcica and a horizontal line joining the superciliary ridges.

Operation, July 11. Curvilinear incision tracing the one made at the first operation. The meninges seemed to be covered with fungous granulations which were curetted. At the center of the denuded area was a loss of substance, through which pus came from the depths, and through which there must have been an escape of brain matter. It was noted that the rounded opening, which had a diameter of 3 or 4 mm., was surrounded by a very resistant fibrous ring. A drain 3.5 cm. long was introduced through the ring. A fenestrum was made in the skin flap and the latter was sutured.

August 15, the wound was pretty well cicatrized, but a small fistulous orifice persisted through which a drop of pus welled out of mornings.

August 27. For two days the headache had been more violent and the purulent discharge more abundant. In the dressing were found two spicules, measuring respectively, 1½ and 2 mm. in length. Careful sounding of the sinus revealed another large and only slightly mobile spicule at the bottom.

September 12 at 7 a. m., there was an attack of aphasia and agraphia lasting about 10 minutes, with slight foam on the lips and not accompanied by loss of consciousness. The same day at noon there was another crisis of aphasia and agraphia, this time with loss of consciousness. (It should be noted that the patient is left handed in reflex acts.) September 16 occurred a typical attack of Jacksonian epilepsy, involving the face, left arm and left thigh. The duration of the attack was three hours, with convulsions lasting ten minutes. In the evening there was impairment of speech without actual aphasia. Exaggerated reflexes and Babinski on the left side.

September 19. No renewal of the attacks, but there was a constant slight interference with speech. Marked papillary stasis on both sides. On exploration of the fistula the spicule could be felt at a depth of 4 or 5 cm.

Second operation, September 21. Vertical incision. A forceps introduced into the fistulous track enabled appreciation of the resistance of the meningeal ring. With the forceps two spiculæ were extracted, one, quite large, situated 1.5 cm. from the orifice, the other, smaller, 4 cm. deep. Drain.

From this time on the patient behaved exactly like one with a brain abscess in process of cure. It should be stated, however, that there was a slight meningeal reaction characterized by a Kernig, some vomiting, and for 15 days, a diplopia due to paralysis of the right external motor oculi. At the second and third dressings the discharge had an only consistence and appearance, with a few strings of pus in it. During the period there were two crises of general epilepsy, one of five minutes and one of ten minutes' duration, twelve days apart and followed by lighter and lighter attacks of Jacksonian epilepsy.

February 25, the wound was completely cicatrized. The patient had only a left hemiparesis and plantar hypoesthesia.

Last February, three years after the last examination, I had news from him. He still complained of a slight headache but of that only.

CASE XI.—DEEP PERFORATING BULLET WOUND OF THE LEFT TEMPOROMASTOID REGION. RECOVERY.

Lieutenant B. was wounded by a bullet June 27, 1916, at Fleury. He entered the Center July 4. At the first examination he was found to have a wound of the left auricle and mastoid region, with traumatic suppurative otitis media. He had aphasia, agraphia, amnesia, slowing of the pulse and prostration. No fever. Pupil reflexes normal. Slight papillary stasis. Radiographic examination revealed numerous deep spiculæ in the upper mastoid and lower temporal regions.

Operation, July 11. Classic mastoid incision, prolonged above to the temporal fossa, and a horizontal incision extending to this at the mastoid border. All the upper part of the mastoid region and adjacent temporal fossa showed considerable shattering. Especially notable were:

1. A spicule which had penetrated into the lateral sinus. On removing the spicule the sinus bled copiously.
2. Destruction of the entire lower third of the temporal fossa. Five or six spicules were in the cranial cavity; some compressed the meninges, others had perforated.
3. A brain abscess (sphenotemporal lobe) which had opened in the region of what had been the antral roof, the orifice giving issue to pus and brain matter. A No. 26 drain was introduced to a depth of 5 or 6 c. m.

Operative results: July 16.—Diplopia, slight photophobia, papillary stasis, and paralysis of the external motor oculi on the right—that is to say, the side opposite to the wound.

July 27. Same symptoms. There was also a right facial paralysis from which it was concluded that there existed a meningeal lesion limited to the apex of the petrous. Locally the drain, which was changed daily, gave issue to pus and sphacelated brain substance. About it the meninges were thickening. Nevertheless there was a tendency to cerebral hernia which was restrained by a pressure dressing.

July 30. The hernia had reached the size of a small nut. It could not exceed this volume because of the fibrous transformation of the meninges about the drain and the firm adhesions between the meninges and mastoid wound. Thenceforth evolution was normal, and on December 1 the officer showing only a slight brain hernia, covered with new formed epithelium, and some trouble with speech and memory, was sent to the neuropathologic center.

When seen again in February, 1919, more than two and a half years after the operation, he complained only of a little headache, some vertiginous phenomena, and total deafness on the left side.

FOREIGN BODIES IN THE BRAIN.

We find spontaneous exclusion of the subarachnoid spaces from cases of foreign body in the brain. It presents itself in two different forms: Either the meninges do not close because of rapid suppuration and a breach persists around which adhesions form, or the meninges close behind the projectile and their cicatrization leads to the formation of a fibrous coating. In the first case we are dealing with a fistulous brain collection. The treatment, then, consists in utilizing the track, dilating it in conformity with the technic described, and when the dilatation is sufficient to permit extracting the projectile to take it out with forceps under the control of the fluoroscopic screen. Such an instance is described in Case 12, for which I am indebted to my colleague Durrien. In the second case the treatment consists briefly in "following the lesion"—that is to say, in going exactly through the fibrous thickening which has excluded the subarachnoid spaces. I have employed this technic in a patient whom I treated in counsel with my friend Dionis du Sejour. In this case to extract the projectile, which was lodged in the parietal lobe at a depth of 3 cm., the bistoury was made use of, but making only a small buttonhole which did not go beyond the limits of the fibrous zone. Here again the operation, which was followed by cure, was done without invading the subarachnoid spaces.

CASE XII.

This is a brief report, for which I am obliged to Dr. Durrien. The patient was Soldier P., of the 414th Infantry. He was wounded at Craonne, May 10, 1917, by a bursting shell which caused a fracture of his skull near the left temporal region, with issue of brain matter. A piece of metal about one centimeter square was lodged in the left temporal lobe near the second convolution, at a depth of two centimeters.

When he entered the neurologic center, September 11, 1917, his symptoms were as follows: Headache, amnesia, slight brain torpor. No fever, pulse 60, exaggerated right rotation reflex, fundus of eye normal. Locally there was a small fistula corresponding to the wound of entrance, with free suppuration. A probe passed into the track entered deeply. In sum there was an intracerebral projectile about which a collection had formed and was draining externally. It was decided to operate by the exclusion method of Dr. Lemaitre.

Preparatory operation, September 24. Curvilinear frontal incision outlining a skin flap. The uncovered bony orifice was not larger than a 50 centime piece. Trepanation, enlargement with the gouge. A drop of pus exuding showed the site of the meningocephalic opening. This orifice was very small, hardly admitting the probe which at a depth of 2.5 cm. came in contact with the foreign body. No attempt was made to extract the latter, since the operation was for the sole purpose of dilating the meningeal opening and reinforcing the adhesions which had already excluded the dura mater about the fistulous track. To this end a drain of 2 mm. diameter was introduced into the fistula, requiring considerable force.

September 28. No meningeal reaction. The dilated track admitted a drain of 4 mm.

September 29. The former drain, which allowed the escape of a drop of pus, was replaced by a drain of 5 mm.

September 30. A drain of 6 mm. was put in with some difficulty.

October 1. Same drain as on the day before.

October 2. Drain of 7 mm.

Second operation, October 3. Extraction of the shell piece with forceps under guidance of the fluoroscopic screen. It was an irregularly rounded piece of shell with sharp projections measuring 7 or 8 mm. in diameter. Grasping the bit with the forceps was somewhat difficult, for it was movable and displaced apparently more deeply into the temporal labe. Extraction, on the other hand, was accomplished easily, without tearing the walls of the dilated fistula. A drain 7 mm. long was put in.

The immediate postoperative results were good. There was no meningeal reaction, no fever, less headache, gradual resumption of cerebral function. From the time of operation the case was treated as an ordinary cerebral abscess. There was normal progress to cure until December 15. On that date the patient was absent four days without leave, during which time his wound was not dressed. December 19 he returned to the hospital with the following symptoms: Violent headache, brain torpor, left hemiparesis, sensory aphasia, word-blindness, rather pronounced word-deafness, no paraphasia, no papillary stasis, slight rigidity of the neck.

December 20. Same condition; temperature, 40° C. It was decided to operate. The operation consisted in replacing the drain in the old abscess cavity, from which abundant pus issued. In spite of drainage the symptoms increased during the subsequent days, and the patient died January 2, 1918.

At autopsy pus was found in the left lateral ventricle and in the third ventricle. There were scattered plaques of meningitis about the upper part of the Rolandic fissure.

WOUNDS OF THE BRAIN, WITH OR WITHOUT HERNIA.

Wounds of the brain which do not immediately produce death tended to repair themselves by the formation of scar tissue which rapidly induces fibrous adhesions of the meninges and brain.

Patients of this kind present themselves to us after the injury with a wound in the midst of which the brain mass is seen more or less modified and with its periphery constituted by a cicatricial zone equivalent to the fibrous ring of fistulized cerebral or cerebellar collections. Just as in the case of such collections an exclusion of the subarachnoid spaces has been effected, which explains why the surgeon should respect the edges of the wound, although he may perform any maneuver required by the local condition of the patient.

The first case of this sort that I shall report was one with a large wound of the occipital region, from which projected a sphacelated hernia of the brain as large as a small orange. I was able to remove all the herniated material up to the immediate vicinity of the occipital cornu of the third ventricle, which was even opened, as I was able to determine at the first dressing.

The patient was operated on in September, 1915, recovered, and wrote to me eighteen months later that on returning to his home he was adjudged capable of army service.

The second case, quite analogous to the first, was one with a wound of the frontal lobe and a hernia of the brain, smaller but also sphacelated. The third case was a brain wound without hernia, in which on enlarging the bony opening the peripheral meningeal adhesions could be clearly recognized.

The fourth and last case was a wounded man who died of encephalitis four or five months after the operation, although he left the hospital apparently cured. In this connection it is understood that wounds of the cerebrum or cerebellum call for a very reserved and late prognosis.

Exclusion of the subarachnoid spaces, either spontaneous or induced, gives a sort of insurance against meningitis and hernia, but cannot be a great safeguard against the complications of encephalitis.

CASE XIII.—VOLUMINOUS SPHACELATED HERNIA OF OCCIPITAL LOBE. RECOVERY.

Soldier V. was wounded in the head August 2, 1915, by a shell during an attack. He sustained shock with loss of consciousness for one or two hours. Without assistance he returned to the rear, was transported to a first aid station, then evacuated in an ambulance. The following day he was trephined for an occipital wound with extrusion of brain matter.

He arrived at the O. R. L. center at Clermont on August 2d. His symptoms on entry were as follows: Wound of the right paramedian occipital region; brain hernia the size of a small orange. General condition defective; considerable emaciation; intense headache; temperature normal; pulse slowed; vomiting. In the presence of these symptoms it was decided to operate quickly.

Operation consisted in:

1. Crucial incision enlarging the skin wound.
2. Enlargement of the trephined area from its original size.
3. Removal with a curette of all herniated necrotic brain matter, which appeared to be the posteroinferior portion of the occipital lobe.
4. Inspection of the circumference of the meningeal wound, which showed adhesions to the brain. The adhesions were carefully respected.

Operative results: The necrosis lessened, vomiting became less frequent, and the general condition improved.

Locally, the brain wound did not tend to necrose further, but, at the first dressing a probe five or six centimeters entered the ventricle. Healing was accomplished by granulation and epidermization.

He left the hospital December 14, showing no symptoms other than slight headache and persistent hemianopsia.

April 5 of the following year, he wrote to me, saying that these symptoms still persisted.

CASE XIV.—STRANGULATED, ABSCESSED HERNIA OF THE FRONTAL LOBE. RECOVERY.

Soldier R. was wounded in the right frontal region by a bomb, October 19, 1915, at Tahure. He was taken away in an ambulance on the 20th, and the same day had a trepanation and an enucleation of the right eye. He entered the O. R. L. center at Clermont-Ferrand, November 14, with the following diagnosis: "Trepanation of the right frontal region; wound not cicatrized." On entering he presented locally a wound of the right frontal region with persistent and rather abundant suppuration.

Operation, November 20. Curvilinear incision, tracing a flap. Elevation of the periosteum. The cerebral hernia appeared to be the size of a nut jutting out through the trephined opening. The dura mater appeared healthy, at the periphery, and formed about the hernia, which it strangulated, a very evident fibrous ring which measured eight or ten millimeters in breadth. The hernia leaked pus from several small orifices.

The herniated brain matter was resected with a knife, and with a curette two small spicules were extracted from the subjacent brain. The skin wound was curetted, was then the size of a five franc piece, and after suture of the flap left an opening through which the brain wound could be explored. A flat, slightly compressive dressing was applied. Healing took place by granulation. February 21, 1916, the patient left the hospital and was sent to the ophthalmologic center for ocular prosthesis.

CASE XV.—WOUND OF THE RIGHT FRONTAL SINUS REGION WITH EXTENSIVE DESTRUCTION OF MENINGES. RECOVERY.

Private D. was wounded April 29, 1915, in the right frontal region by an exploding shell. He was taken to the evacuation post in an ambulance, where he was trephined. July 22 he came to the Center because of "fistulæ and suppuration near the right superciliary ridge." Cerebral pulsation persisted at the point of trepanation.

Operation: Incision in the eyebrow as for a frontal sinus operation; vertical incision above it corresponding to the cerebral pulsation; elevation of periosteum. The pus filled frontal sinus no longer had any posterior wall. Above it the brain, which was adherent to the skin, was denuded of its meningeal covering over a surface the size of a five franc piece. Around this area the meninges adhered to the brain like a fibrous coat. The frontonasal çanal was curetted and the frontal bone was smoothed with forceps. The skin was united by sutures save over the denuded cerebral convolutions, to which a slightly compressive flat dressing was applied.

Operative results were normal. February 16, 1918, he was sent to the hospital depot with a recommendation for service in the reserve.

CASE XVI.—ABSCESSED HERNIA OF THE FRONTAL LOBE. DEATH.

Private C. was wounded at Beausejours June 21, 1915. He was evacuated by ambulance and trephined the same day. From there he was sent to Hospital No. 7 of the 15th Region, and sent to me October 14. On his entry there was noted slightly above and external to the sinus a brain hernia the size of a pigeon's egg covered with granulations and pulsating. The patient complained of headache and vertigo. His pulse was a trifle slow. There were no disordered reflexes and no fever.

Operation, October 19: Curvilinear incision forming a flap, elevation of periosteum, enlargement of the trepanation until normal dura was uncovered. The border of the cerebromeningeal wound was carefully respected, while, on the other hand, the central portion was curetted. Pus to the amount of a spoonful and a half was discharged. With the curette two small spicules were brought up from the deeper tissues. A fenestrum of about four centimeters in diameter was made in the flap and the latter was sutured. A slightly compressive dressing was applied.

Operative results were normal. Healing was by granulation and epidermization. While awaiting presentation to the service commission the patient was sent on convalescence service. In January he was sent urgently to a hospital where he died of encephalitis.

Autopsy showed the signs of a diffuse encephalitis. It also established that besides cerebromeningeal adhesions there was a fibrous transformation of the meninges for a considerable distance about the traumatized area.

CONCLUSIONS.

1. The meninges, like all serosa, protect themselves by forming adhesions.

War wounds furnish us daily examples.

These adhesions produce an actual spontaneous walling-off of the subarachnoid spaces, comparable in every way to the exclusion of the greater peritoneal cavity.

The surgeon should respect these adhesions and sometimes add to their usefulness by reinforcing them.

2. The meninges when they are healthy may, at any desired point, be transformed into a fibrous layer.

This fibrous covering, whose formation is obtained at will, constitutes an induced exclusion of the subarachnoid spaces.

The surgeon should always do this when he intends to go into the brain.

3. Induced exclusion of the subarachnoid spaces can be accomplished almost infallibly by a simple precise technic.

4. The advantages of an induced exclusion are these:

Meningitis is averted; brain hernia is avoided.

5. Meningeal exclusion finds application in the treatment of cerebral and cerebellar collections of whatever origin. It can also be applied in other varieties of brain surgery, such as the search for and extraction of certain foreign bodies.

6. Exclusion of the subarachnoid spaces, by its altering the prognosis in surgical affections of the cerebrum and cerebellum, seems to mark important progress in brain surgery.

II.

LEUCOPLAKIA LARYNGIS.

By Norval H. Pierce, M. D.,

Chicago.

Keratosis as it affects the larynx is most frequently limited to the region where pavement epithelium forms the normal covering, namely, the interarytenoid space and over the vocal processes; it is then most commonly known as a pachyderma laryngis.

However, the disease does rarely appear in regions where cylindrical epithelium is the normal covering, namely, on the upper surface of the vocal cords. These occurrences have been used in support of metaplasia hypotheses by adherents of that thesis. As islands of pavement epithelium are found in laryngeal tissue where cylindrical epithelium is the normal covering, it is more reasonable to suppose that the keratosis develops from these islands than that one type of epithelium is transformed into another. The case reported by Flotau would seem to point to the probability of one type of epithelium being able to replace all other types found in the larynx.

The disease as it occurs in these extraordinary regions is rare, and for this reason I have availed myself of the privilege of reporting the two following cases:

G. DeV., male, age 63, a composer of music and vocal teacher, a student of Garcia, came from England to visit the Chicago World's Fair. He determined to remain in Chicago and opened a studio. He consulted me because of a hoarseness which appeared whenever he used his voice to an unusual extent in vocalization. He was a vigorous, well preserved man, and at the time I first saw him was not at all hoarse. Laryngoscopy disclosed the following picture: A large larynx; the interarytenoid space and vocal processes were normal. In the middle of the left vocal cord was a pearly white patch about a fifth of an inch long. Laterally it extended from the outer border of the vocal cord to its inner edge, over which it projected in a finely serrated manner.

The anterior and posterior edges of the patch were square, but had a frayed appearance—that is, delicate pearly white lines alternated with pinkish interspaces. There was no interference with movement of the cord. The rest of the cord was slightly more hyperemic than the right, which was of the brunette type. Considering the man's age and the laryngeal picture, malignancy was suggested to my mind. However, he was advised to use his voice as little as possible, and requested to report from time to time for observation. This he did for a period extending over five years, and no striking change occurred in the appearance of the disease other than this: he informed me that occasionally he coughed up a small piece of membrane. He was never able to save this for me so that I could never examine it myself, but after such an occurrence the patch was distinctly less white in appearance. In all probability we had here a periodic desquamation of the outer layers of epithelium from the placque of leucoplakia. He returned, I believe, to England after an unsuccessful struggle in America, and I have not heard from him since.

A. B., male, age 57; American; a grain operator; dealt extensively "on the floor"; used tobacco and spirits liberally. Consulted me in consequence of hoarseness. The laryngoscope revealed a pearly gray patch about a quarter of an inch long on the middle of both vocal cords, the edges of which were irregular. The cords themselves were pink and distinctly thickened. The mucosa over the vocal processes was thickened and of a deep red color, but there was no visible pitting. The movements of the cords were normal. He was advised to abandon floor trading, and the usual treatment for chronic laryngitis was instituted. The inflammatory condition subsided, and his voice, though cloudy, lost much of its hoarseness. The patches remained unchanged. During the course of three years he had many relapses, which were easily explained by vocal abuse on the Board. At length, after an unusually severe relapse he returned to me with the information that he at last had come to agree with me regarding the cause of his trouble, and had decided to go to California and give his voice a long rest. The appearance of his larynx at this time was distinctly alarming. The cords were more thickened, the edges more grossly irregular, but the patches were unchanged or only slightly increased in area. He complained of a sense of discomfort in his throat. After some months' stay in California he again returned to Chicago. He could speak only in a hoarse whisper. There was dyspnea on exertion. The laryngoscope disclosed two tumor masses replacing the vocal cords with coarsely granular surfaces, pinkish white in color, and so large as to leave only a small chink between them in the middle line. The process had been diagnosed malignant from pieces excised. He had been advised to have the growth removed by the direct method. I disagreed with this opinion, my reasoning being thus: If the growth was malignant, nothing short of a laryngectomy extirpation could save him. If it was not, laryngofissure provided a more exact method of removal than direct laryngoscopy. The subsequent history of the case justified my view. The patient was tracheotomized, the larynx was opened, the growth removed, and immediate frozen sections confirmed its nonmalignancy. Radium was placed in direct contact with the cut surfaces within the larynx on several days, after which the larynx was closed. The man has had no recurrence after a year.

We have here several points of interest to contemplate.

1. Keratosis as it affects the laryngeal mucosa may infrequently appear primarily in regions other than those for which it shows a predilection and where the squamous type of epithelial cell is not the natural covering. Indeed, the entire mucosa of the larynx as well as that of the epiglottis may undergo this keratotic change, as exampled by the case reported by Flotau. It may be well to remember that this keratosis is a disease per se, but may accompany other diseases, such as tuberculosis, syphilis and carcinoma itself. While in the first case there was no histologic confirmation, the diagnosis of leucoplakia was sufficiently confirmed by the laryngoscopic appearance and the clinical course of the affection. Herbert Tilley reports a case (Proc. Royal Soc. Med., 1915-1916) which in a general way corresponds to mine.

2. The desquamation feature in the cases that occur outside of the interarytenoid regions is interesting. Our distinguished guest and others have reported such instances. No doubt it frequently occurs in leucoplakia of the tongue and

vocal surfaces. Here, however, the scales are rubbed off by food and are swallowed without attracting the individual's attention. In the larynx, however, they form a source of irritation during the process of exfoliation and are forcibly projected into the mouth. One can readily imagine that if the case is first seen at the moment when the desquamation is occurring, this factor might add to the difficulties of a differential diagnosis. This is especially true when the process affects the lower margins of the cords.

3. The change in type which occurred in the second case from pachydermia planus to pachydermia verrucosa was interesting. The change is very simple and consists in the ingrowth of the epithelial elements and an increase of the connective tissue elements, and may be accounted for by the activating influence of whatever irritating agency causes the original disease, without a break occurring in the limiting membrane.

4. The method of approach in dealing surgically with such conditions as the second case illustrates may furnish a just ground for difference in opinion. It is my opinion that in certain cases where extensive disease of the interior of the larynx necessitates removal, laryngofissure is preferable to indirect or direct endolaryngeal methods, because it gives us greater liberty of movement, greater visibility, is more rapid and is quite as safe.

III.

HEMOPHILIAC TYPE HEMORRHAGE—TREATMENT BY TRANSFUSION.

By Austin A. Hayden, M. D.,

Chicago.

This paper is presented to emphasize the usefulness of transfusion in the control of hemorrhage in patients whose clotting time is abnormally slow, and in whom the bleeding persists as a capillary oozing after all mechanical means for hemostasis have failed. Its scope is limited entirely to the treatment of hemophiliacs, or perhaps more properly to patients whose blood clotting period is abnormally long.

In reality, hemophilia is a very rare condition, with an extremely interesting and extensive literature. The first description of the disease can be found in the Crerar Library in the original article by John G. Otto, early in 1803.[1] The "Natural History of the Village of Kinderbrook" immediately follows, showing the versatility of this publication. Otto, according to his bibliography, read by Isaac Parrish, M. D., the physician in his last illness, before the College of Physicians of Philadelphia by appointment March 4, 1845, was one of the earliest physicians of Philadelphia "to confine himself wholly to the practice of medicine, avoiding surgery and obstetrics." His observations on "An Hemorrhagic Disposition Existing in Certain Families" are stated in precise, well chosen English. With but few additions it would be a classic description even today.

"About seventy or eighty years ago, a woman by the name of Smith settled in the vicinity of Plymouth, New England, and transmitted the following idiosyncrasy to her descendants. If the least scratch is made on the skin of some of them, as mortal a hemorrhage will eventually ensue as if the largest wound is inflicted." He speaks of the blood being in a "high state of effervescence," of the various remedies that have been tried in vain, among them being "the bark, astringents used topically and internally, strong styptics and opiates. A few years since the sulphate of soda was accidentally found to be completely curative of the hemorrhages I have described. An ordinary purging dose, administered two or three days in succession, generally stops them: and by a more frequent repetition is certain of producing this effect. The cases in which the most powerful, and apparently the most appropriate remedies have been used in vain, and those in which this mode of treatment has been attended with success, are so numerous that no doubt can exist of the efficacy of this prescription. Deceptions may take place from accidental coincidence: but when a complaint has often ocurred, and been almost uniformly fatal, without the administration of a certain remedy, and has constantly yielded when it has been given, skepticism should be silent with regard to its utility. Nor should our inability to account for the fact upon the theory and principles we have adopted be conceived as a sufficient reason for disbelieving it."

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[1] "Medical Repository and Review of American Publications of Medicine and Surgery and the Auxiliary Branches of Science—conducted by Samuel Latham Mitchell, M. D., and Edward Miller, M. D. Copyright secured, New York. Printed and sold by T. and J. Swords, Printer to the Faculty of Physic of Columbia College, No. 160 Pearl Street."

The proceeds: "The prescription being in the Smith family and the cases that have been attended by physicians not being very numerous, it is impossible to ascertain the various states of the system in which it has been given, or to form any correct conclusions regarding its manner of acting. No experiments have been made on the blood to discover if any, or what changes take place in it."

"It is a surprising circumstance that males only are subject to this strange affection, and that all of them are not liable to it"—although females are exempt, they are still capable of transmitting it to their male children, as is evidenced by its introduction, and other instances, an account of which I have received from the Hon. Judge Livemore, who was polite enough to communicate to me many particulars upon this subject. This fact is confirmed by Drs. Rogers and Parker, gentlemen of character, residing in the neighborhood. When cases shall become more numerous, it may perhaps be found that the female sex is not entirely exempt."

Benjamin Rush, Dr. Otto states, had seen two cases in his own practice and recites the history of a Maryland family of six children, four of whom died of bleeding from trifling scratches or bruises. A small pebble fell on the nail of the forefinger of the last of them when at play, being a year or two old; in a short time the blood issue from the end of that finger until he bled to death.

While Otto's paper was the origin of our knowledge of this subject, hemophilia was evidently known to the ancients. Abacusis or Asaharavius, the greatest surgical writer of the Moorish period, stated that in a certain village there were men, who when wounded only slightly, bled to death. Alexander Benedictus, 1539, tells of a Venetian barber who bled to death from a trivial wound on the nose inflicted by his own scissors.

Most of the literature has come from America. The most notable exceptions are the extensive monographs of Ludwig Grandidier,[4] Wickham Legg[5] and Bulloch and Fields.

The latter two define hemophilia as a "disease characterized by excessive or chronic liability to immoderate hemorrhage The liability is hereditary and, in our opinion, based upon the published evidence, is confined to the male (bleeder) but transmitted by the female (the conductor)." This is generally known now as Nasse's law.[6] The characteristic hemorrhage is a trickling, oozing from a surface and not from any one large vessel proceeding from a traumatism that would be of any consequence to a normal individual. It is always traumatic.

The most frequent sites are the nose, mouth (after extraction of teeth), joints, umbilicus in the newborn and penis following circumcision.

Cause and Occurrence.—The essential cause of hemophilia seems to lie with the blood platelets. The walls of these cells apparently are not sufficiently soluble to liberate their intracellular protoplasm (thrombokinase?) which is necessary for blood coagulation.[7] Either the thyroid or liver or both may be responsible, for these alone, of all the body tissues of the hemophiliac, fail to promote blood coagulation.[8]

Frequently troublesome hemorrhages are accredited to the hemophiliac diathesis, and many patients are designated as bleeders, in whom the clotting is well within the normal limits. In these cases adequate surgical means of hemostasis have not been used. They might well be designated as surgical hemophilia.

True hemophilia in reality is a very rare condition. Grandidier[8] states that there were only ninety-three families of bleeders in the entire German empire in 1877, with but two two hundred and fifty-eight members affected. With the more accurate present laboratory methods this number would undoubtedly be decreased very materially were these cases examined at this time, especially since twenty-two of his cases were females.

Tendency to hemorrhage is seen in many of the following diseases. Of these jaundice is the most common; others of less frequent occurrence are typhoid fever, anemias, leukemias, purpuras, Barlow's disease, peliosis rheumatica and essential hematura.[9] Severe bleeding may follow diphtheria, quinzy, yellow fever, influenza, and surgical procedures, especially in the throat and nose (secondary hemorrhage). These cases must not be confused with true hemophilia.

Case Report.—Fred A. B——, a married man, thirty-nine years of age, came to the writer in July, 1918, complaining of recurrent head colds and slight attacks of sore throat followed by rheumatic pains. His tonsils were enlarged. From their crypts pus could be freely expressed. His nasal septum was sharply deflected to the left low down. Family and personal histories were given as generally negative with the exception of a severe attack of smallpox he had suffered years ago. Syphilis was denied. His general physical examination was negative. His nose and throat work was done under general anesthesia a few days later. The submucous resection (after Killian) was confined almost entirely to the cartilages. One Bernays sponge was inserted into each nostril. The flaps were not perforated. The tonsils were removed by dissection and snare. The bleeding was less than usual from each. Both tonsil fossæ were dry when the patient left the operating room. The operation was commenced at 8 a. m. and finished at 8:30 a. m.

Five hours later (1:30 p. m.) the nurse reported that the patient's bleeding, which had commenced about half an hour after his return to bed, was not stopped. At 2:30 p. m. another Bernays sponge was placed on each side of the nose. At 5:30 the bleeding from the nose was continuing at about the same rate—i. e., twenty-five drops a minute, with some trickling back into the throat. The sponges were removed, the flaps separated and the septal cavity was carefully suctioned and sponged in an effort to locate the bleeding point This was unsuccessful. In about half a minute the cavity would slowly fill up with blood which appeared to well up from all over. The Bernays sponges were reintroduced with strips of tannic acid gauze packed tightly against their outer sides.

At 8:30 p. m. the bleeding was still continuing at the same rate from the nose and mouth. The posterior nares was now seemingly packed on the left (operated) side and the sponges and tannic acid gauze were replaced. Coagulation period by the glass pipette method was taken and found to be fifty minutes. Hemoglobin was eighty per cent. The patient was feeling well, remarkably well in spite of his very considerable loss of blood.

At 9:30 p. m., twenty cc. of normal horse serum was given deep in the muscles of the abdominal wall. At 11 p. m. (fifteen hours after the operation) the blood was still dripping from the nose, about twenty-five drops a minute, with a considerable amount running back into the throat. Dr. Henry W. Ablemann transfused one hundred cc. of blood from the arm of the patient's sister, who was mistaken for his sister-in-law. The bleeding seemed to be less, and the patient was returned to his bed after having received one-quarter grain morphin.

At 8 a. m. (twenty-four hours after the operation) blood was trickling from his nose and running back into his throat at the same rate. A second transfusion was made—this time from his sister-in-law instead of his sister. Five minutes later the bleeding had stopped completely. The coagulation period was now five minutes. The hemoglobin was seventy per cent. The patient was feeling splendidly and asking for something to eat.

On questioning the patient's father closely some vague history of severe bleeding was elicited in an uncle on his maternal side. The patient's sister, in the first and unsuccessful donor, is a young unmarried woman. It will be extremely interesting to note whether or not she proves to be a conductor of hemophilia. Her coagulation period was six minutes. She had had an uneventful abdominal section within the year. The second donor's (sister-in-law) blood clotted in eight minutes.

The author is fully aware of the fact that the above case does not entirely meet the requirement laid down by Bullock and Fildes.[5] These excellent investigators maintain that no single hemorrhage, however severe or inexplicable, can properly constitute a diagnosis of true hemophilia—only repeated bleedings either from birth or early childhood are sufficient for this.

In conclusion, however, some interesting speculations arise:

1. Can the coagulation period of non-hemophiliac blood be so long as to cause a hemorrhage such as this patient had? Is the hemophiliac himself always a hemophiliac or will his blood at times clot normally or nearly so?

2. Are the tissue juices that favor coagulation more abundant in the throat than in the nose? This would explain the dry tonsil fossae.

3. How lasting may the results of transfusion be? Two months later this patient had an uneventful tooth extraction.

4. Enormous quantities of blood can be lost, if the bleeding is slow. In this case probably more than four quarts of blood was lost in twenty-four hours by nose and mouth. At the end the hemoglobin was 70 per cent. and the red cells three and one-half million.

5. Transfusion in such cases, seems to be the logical and sure way of stopping the bleeding. Abelmann's splendid technic[11] reduces what was formerly a formidable major operation to a very simple, bedside if necessary, procedure.

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IV.

THE OTOLARYNGOLOGIC FEATURES OF THE INFLUENZA EPIDEMIC AT CAMP HANCOCK, GEORGIA, SEPTEMBER-DECEMBER, 1918.*

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At an officers' meeting held immediately after dinner on Sunday, Sept. 29, 1918, it was announced by the Commanding Officer of the Hospital that telegrams had been received stating that in the course of the day two troop trains would arrive at Camp Hancock. On one of these trains were 50 sick soldiers and on the other 90. It was further announced that beds had been made available for these men and that the hospital was in every way prepared to receive them.

Early in the evening the sick boys began to arrive and it was seen almost at once that the number would be far in excess of that indicated by the telegrams. From late afternoon till well into daylight next morning they came pouring in, brought from the railway station by ambulance and truck. When a count was made it was found that instead of 140 sick soldiers, the morbidity in the trains had increased with such speed and to such an extent that 770 men were brought to the Hospital directly from those trains.

While a few sporadic cases had developed in Camp Hancock, the real epidemic began, and in very stormy fashion, with this influx from the troop trains from Camp Grant. And a very sick lot of boys they were!

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Almost at once were the specialized services of the members of the Otolaryngological Department called for, the first complication requiring attention consisting of many cases of violent and persistent epistaxis. As the days passed other phases of the disease developed and had to be taken care of.

The main concern of the department was the ear, especially in its suppurative and mastoid aspects. The Chief of Service at Camp Hancock was determined from the first to leave unattended to no detail which would promote the healing of acutely affected ears and prevent mastoid complications. In this he was ably and untirely supported by the members of his Staff, by the Chief of the Medical Service and by the Ward Surgeons, by the former in ordering and carrying out the treatment decided upon, and by the others in co-operating in every way in carrying out the plans laid down.

In order that all such complications should receive prompt attention a request early was voiced at an officers' meeting that all cases of ear pain be reported at once to the Department of Otolaryngology. This was to be in force both during the day and night. This request soon was found to be insufficiently broad, because in the first days of the epidemic it was noted that some middle ear cavities were found to be filled with pus, with the patient complaining, not of pain, but only of deafness and a sense of fullness in the ear. As a result of this observation it was requested that any patient complaining of any ear symptom whatsoever, even if only a sense of fullness, be immediately reported to the Otolaryngological Department. In order that no calls should go unanswered an orderly constantly was on duty in the Head Section Building, one orderly sleeping in the building near the telephone. It was hoped in this manner to secure prompt 24-hour service, and such in fact proved to be the outcome.

By this plan, nearly if not quite every patient who presented ear symptoms was seen by a specialist within half an hour of the time notification of his condition was received by the department.

In carrying out the details of visiting the cases, the hospital was divided into three equal parts, and to each part was assigned one junior member of the staff. These men started in at 8 o'clock in the morning and made rounds of the portions of the hospital assigned to them. At each ward or tent group the surgeon would see the cases which he knew required attention and would inquire as to whether or not there were any others. At 10:30 a. m. each man would telephone the clinic to find out if any emergency calls had been sent in from the portion of the hospital under his care. The night calls were answered by the officer on emergency duty, and when there was more work than he could handle, a second, and sometimes a third member of the department was called upon.

The chief of the department remained throughout the day in the Head Section Building, receiving calls and distributing them, and seeing with the ward visiting surgeons those cases on which the latter desired the opinion of the chief.

The main difficulty met with in examining and treating the patients was in securing adequate illumination. When it is realized that at least two-thirds of the sick boys were on porches or in tents the force of this statement will be more fully realized. Whenever possible, sunlight and diffuse daylight were used. Frequently the patient would be in such a position in ward, porch or tent that the rays of the sun could be focussed by the head mirror on the region being examined. This made an ideal light and was taken full advantage of. Diffuse daylight could be used in examining throats, but of course was of no value in examining the nasal cavities and ears.

The usual source of illumination was oil lanterns, with which each ward and tent group was provided. This was very satisfactory in the wards, but on porches and in tents the presence of so much diffuse sunlight rendered impossible clear illumination of the nasal chambers and of the external auditory canal and ear drum. This difficulty was overcome by having orderlies hold a blanket around the surgeon and patient, thus making a screen and forming a dark room, and cutting off sufficient daylight to allow the reflected light from the lantern wick to illuminate with all necessary clearness the parts being examined.

A second handicap was the impossibility, on account of relative shortage of nurses and orderlies, of carrying out in detail the routine ear treatment which was in force in the hospital.

Otolaryngologists agree that in all cases of acute tubo-tympanic disease treatment of the nose and nasopharynx is advisable, not to say imperative. Under the conditions in which this epidemic was handled, it was utterly impossible to administer such treatment. The nursing and orderly staffs were driven to the utmost in order to carry out the fundamental necessities of general treatment, and neither personnel nor appliances were available for nasal treatment. Almost to a man the cases of ear involvement went through the attack with no treatment except to the ear, and so successful was the outcome that one is tempted to question the vital necessity for nasal and nasopharyngeal treatment as a routine measure in acute middle ear disease.

As stated above, the main concern of the department was to minimize to the utmost the effects of involvement of the ear. For each case of acute otitis media, whether open or closed, it was endeavored to have administered the simple treatment described below. On account of the wide scattering throughout the entire hospital of these cases, the amount of time required to administer the treatment, the shortage of skilled nursing and the lack of paraphernalia, it was not possible in all cases to have it carried out. When it is realized that the number of patients in the hospital jumped in a few days from 1,500 to nearly 4,000, the obviousness of these difficulties will be appreciated. In addition, three members of the otolaryngologic staff were victims of the influenza, none fatally, however, but nevertheless throwing a very heavy burden on the rest.

This routine treatment was as follows:

1. Absolute rest in bed.
2. Irrigation of the ear every four hours with 2,000 c. c. of hot normal salt solution. The more severe cases received irrigations every three, and even every two hours.
3. Filling of the ear with a hot solution of phenol (10 per cent) and glycerin (90 per cent).
4. Filling the ear loosely with absorbent cotton.
5. Covering the ear with a large wad of absorbent cotton, which was bandaged in place.

6. Keeping a hot water bottle constantly against the bandaged ear.

As the ear improved, first the heat, then the bandaging and finally the irrigations were dispensed with.

As a result of the system of prompt notification of the department of all cases presenting ear symptoms, practically every case was seen in its earliest stages. If the ear drum was found to be normal in contour, the treatment just described was ordered. If the slightest amount of bulging was present the rule followed was to incise freely and at once. Each ward visiting surgeon carried with him the appliances for performing this little operation. There is no doubt that there may have been opened some middle ears which would have gone on to resolution without complications or sequelæ, but it is certain that there were no ear drums needing an incision that did not have one.

When an anesthetic was used, it was the usual mixture of equal parts of cocain, phenol and menthol. Sometimes it was effective and sometimes it was not. When the patient was very nervous and time would allow of it, an attempt was made to benumb the ear drum with this solution. Otherwise the drum was opened without an anesthetic.

The results of our plan of procedure can best be shown by reference to the figures for October, November and December. The real epidemic began, as stated above, with an influx of patients on Sunday, September 29, 770 cases being admitted to the hospital on that day and during the night following.

During October many hundreds of ear cases were seen in bed and in clinic. On account of the hectic conditions under which everyone was working, it is impossible to give the exact number. During November the number was smaller and during December it was smaller still.

In the three months there were 322 cases requiring myringotomy. In a few instances a second incision had to be made, and on still fewer a third. Of these cases 202 required incision of the ear drum in October, 89 in November and 31 in December. Many of these developed tender mastoids. When the latter condition appeared a special endeavor was made to have the patient transferred to a ward where the routine treatment described above could be administered. The result was a most happy one, as not a single one of the October cases required a mastoid operation, report for that month reading:

Myringotomies....................202 Mastoidectomies.................... 0

There were no cases of sinus thrombosis and none of otitic meningitis; in addition none of the acute suppurative middle ear cases became chronic, everyone sending in a dry ear and a healed perforation.

By the following month (November) the epidemic was on the wane, and the work of the department had lightened materially. The November report read as follows:

Myringotomies .... 89 Mastoidectomies 4

Only two of these operations followed influenza, and both of them occurred in one soldier. This boy was a very septic specimen, with a negative Wassermann reaction. First (October 24, 1918) he developed a large external perichrondritic abscess of the thyroid cartilage, which was opened and drained. This was followed later (November 13, 1918) by a mastoid abscess of the left side, and still later (November 16, 1918) by the same condition on the right. Both of the other November mastoids were cases in which the middle ear became involved in the course of an acute coryza.

In December there were five mastoid operations performed and two of these were postinfluenzal. Of the others, two followed measles and one a coryza. The December report read as follows:

Myringotomies .... 31 Mastoidectomies 5

In this month the influenza incidence was very low, until about the middle of the month, when there was a slight recrudescence of the disease. The great majority of the ear cases in December developed in conection with either a coryza, measles or scarlet fever.

These figures, in the minds of the writers of this report, constitute rather a notable showing. The total admissions of influenza cases to the Base Hospital for the month of September-October (including September 29th and 30th) were 6,553. In November there were 1,162 and in December 66, making a total of 7,781. In addition to this, during those three months there were 426 admissions for measles and 418 for scarlet fever. Added to these there were a large number of cases admitted on account of ear or throat or nose conditions alone. From this large number resulted only eight cases requiring mastoid operation, one of these being bilateral, thus making nine operations in all. It might be added that all of them healed or are healing in the usual four to six weeks, with no complications or threatened sequelæ. One of them developed decided weakness of the facial muscles of the affected side, but shortly after the mastoid was cleared out the symmetry of the face returned to normal.

HOSPITAL ADMISSIONS.

	Influenza	Measles	Scarlet	Myring-otomies	Mastoid Operations
*Sept.-Oct.	6553	145	6	202	0
November..	1162	215	401	89	4
December..	66	65	11	31	5
Total	7781	426	418	322	9

MASTOID OPERATIONS.

	Post-influenza	Post-measles	Post-scarlet	Post-coryza	Total
*Sept.-Oct.	0	0	0	0	0
November..	2	0	0	0	0
December..	2	2	0	1	5
Total	4	2	0	3	9

*From September 29th to October 31st, inclusive.

It is barely possible that during the fall and early winter of 1918 the organisms which attacked the upper air passages had a very slight selective affinity for the mastoid. The notable escape of the tympanic adnexa from serious trouble at first tended to support this view. But as the season advanced and the acute exanthemata began to come in in increasing numbers, and still the mastoid incidence remained negligibly low, it seemed justifiable to assume that the prompt and careful treatment accorded all ear cases was an important factor.

It is quite probable that this low percentage of mastoidectomies could hardly prevail in civil practice, because such immediate and painstaking treatment would not and could not be obtained. One factor in this would be that ear affections frequently are considered to be trivial matters by a certain element both of the medical and lay population. Furthermore it should be realized that the soldier patient is under orders, and is obliged to submit at once to whatever treatment is deemed best for him, with no opportunity afforded him of refusing or postponing the measures decided upon by his officer surgeon.

In the external ear there developed a few (seventeen) cases of furunculosis and a large number of serous or serosanguinous blebs, the latter being the condition called by Politzer otitis externa hemorrhagica.

Otitis externa hemorrhagica. This condition was found almost exclusively in the influenza cases and always was confined to the osseous portion of the external meatus. Sometimes the blebs would be of a purplish hue and at others clear and watery, resembling on the one hand a "blood blister," or, on the other hand, an ordinary "water blister." At first they were routinely incised, but later they were left alone unless they interfered with inspection of or drainage from the middle ear. Quite frequently they were found to be as sensitive as is the ear drum.

Epistaxis. But one obtruding condition was found in the nose, and that was profuse and persistent epistaxis. In every case but one the bleeding point was located at the anterior part of the septum, the socalled locus Kieselbachii. In the one exception a spurting artery was observed on the lateral wall of the nose at the anterior end of the inferior turbinated body. The incidence of epistaxis was the greatest in the first influx of cases. These boys were brought in directly from the troop trains after two days or more of travel with limited bathing facilities, and it is believed that the irritation and excoriation of the nasal mucosa produced by the train dirt was an important causative factor. Epistaxis became much less frequent in the later days of the epidemic, when the cases were developing in those soldiers which had been in camp for several days.

Sinusitis. The incidence of sinusitis was exceedingly low. Exact figures are not at hand nor are they obtainable. When a case of this sort developed, a routine spray of adrenalin chlorid, 1 to 7,000, was given every hour, and when the pain was severe the middle meatus was packed for half an hour or more with cotton pledgets saturated in the same solution. All of these cases returned to normal and none required operation for their relief.

Tonsils. There were very few cases of tonsillitis and still fewer of peritonsillar abscess. During the months of October, November and December there were but thirten cases requiring the evacuation of pus.

Larynx. Laryngitis was present in quite a few cases, and the manifestations in the larynx were of three different types: (1) Diffuse catarrhal laryngitis, with the usual appearance found in this condition; (2) ulcerative laryngitis, with small, narrow, superficial ulcers running lengthwise of one or both cords, and (3) what might be called "asthenic laryngitis."

A section of ulcerated cord from a case of type 2 was submitted to the pathologist, who reported on the specimen as follows: "Section shows mucosa with an irregular loss of substance, with submucosa exposed, which with muscle tissues still deeper is infiltrated with polynuclear leucocytes. Diagnosis: Acute inflamation of vocal cords with ulceration."

The last form, 3, deserves a more detailed description. It was found almost entirely in a group of cases which came from among the soldiers who had been in Camp Hancock for some time. It was characterized by a normal or slightly reddened mucosa, absence of ulcerative lesions and mainly by a marked weakness of the laryngeal musculature. An attempt at phonation would result in a feeble effort to approximate the vocal cords and an immediate discouraged return of the cords to the respiratory position. A similar condition of the palatal and pharyngeal and probably of the esophageal musculature usually was found to be associated with it. The muscular efficiency of the entire throat was very low, and it was tested out in one patient by having him endeavor to swallow a large mouthful of water. The effort at deglutition immediately was followed by a gush of water from his nose and by cyanosis. It was evident that the muscles neither of his soft palate nor of his larynx had the strength to close off the entrances to the cavities which they guard. In a short while he was able by a few weak coughs to clear his larynx and trachea, but for the moment it looked as if he was in imminent danger of suffocation from the water, which he was unable to prevent entering his trachea and then was almost unable to expel from it.

The actual cause of this condition could not be determined. Possibly it was a toxic myositis, possibly just a part of the general asthenia, possibly it was due to a toxemic poisoning of the centers in the medulla, really constituting an acute form of bulbar paralysis.

The members of the otolaryngologic staff feel that they were in great good fortune to have been at Camp Hancock during the epidemic. Rarely does a physician or even a collaborating group of physicians have an opportunity of studying synchronously such a large series of cases, occurring in people of approximately uniform age and living under identical clothing, housing and dietary conditions. Usually observations on a large number of cases must extend over a long term of years and under such conditions early impressions and conclusions are likely to grow hazy and later ones assume undue prominence and force. While necessarily conditions in this epidemic were such that an accurate record of all phases of the influenza was impossible, still it is felt that so careful an estimate has been made where actual records were not obtainable that conclusions drawn can fairly be considered as being based actually on numerical fact.

V.

EXTRADURAL IRRITATION AND ABSCESS.*

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In presenting this paper the author hopes to contribute something to the subject which will help to early recognize the symptoms of extradural irritation or abscess, so that by early exposure of the dura many serious and fatal complications may be prevented.

The dura is composed of two layers, the outer, or periosteum, and the inner, or vascular. It lines the cavity of the skull like a periosteum and surrounds all the nerves and blood vessels at the openings into the skull and joins with the periosteum on the outside of the skull. The inner layer only of the dura surrounds the optic nerve all the way to the eyeball. This explains why toxins in the orbit so easily gain access to the optic nerve, causing optic neuritis or meningitis. The dura not only lines the skull, but extends deep between the hemispheres of the brain, forming the falx cerebri and falx cerebelli as well as separating the cerebellum from the cerebrum by the tentorium cerebelli.

The dura is extremely vascular, enveloping nearly all the large arteries and veins in the skull. The anterior fossa is supplied by the anterior meningeal branches of the ethmoid arteries and internal carotid; the middle fossa by the middle meningeals, branches of the internal maxillary, the recurrent from the lacrimal and the ascending pharyngeal branches from the internal carotid; the posterior fossa by the posterior meningeal branches from the vertebral and the meningeal branches of the occipital arteries.

All this blood is carried away from the head by the venous sinuses which are all in the dura. I have emphasized the above to show that any slight hindrance of the return circulation in the dura may cause capillary edema and produce marked symptoms. The skull cavity is completely filled with tissues and any slight increase or decrease in its contents will produce symptoms.

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The dura is also well supplied with nerves and therefore a very sensitive organ and very painful on manipulation, whereas, the brain tissue itself is not sensitive and can be handled without pain. The nerves supplying the dura are the recurrent branch of the fourth, branches from the ophthalmic, hypoglossal, sympathetic, filaments from the Gasserian ganglion and recurrent branch given off from the root ganglion of the pneumogastric nerve.

Etiology.—The etiology of extradural irritation may be classified under mechanical and infective irritants.

Under mechanical irritants we have foreign bodies, such as bullets, etc., adjacent to the dura. Fracture of the skull with depression of spiculæ of bone pressing against the dura. Extradural hemorrhage accompanying fractures is very frequent. Absorption of the blood clot without infection will leave a deposit of lime salts on the dura, according to Dr. C. C. Rogers, having the feeling and appearance of sandpaper, and causes very severe headaches. Decalcification and swelling of the skull bone, due to altered internal secretions, may irritate the dura, providing the bone thickens or swells and pushes blood and lymph vessels to the dura.

Under infective irritation of the dura we have acute and chronic purulent infections of accessory sinuses of the nose such as the frontal, ethmoid and sphenoid sinuses, as well as suppurative infections of the middle ear—that is, the tympanic cavity, attic, mastoid and mastoid antrum. Cholesteatoma of the above mentioned structures produce only mild symptoms of extradural irritation.

Infection of extradural blood clots will form an extradural abscess. Infective irritants are usually extradural abscesses, but I have had a number of cases where there was granulation tissue on the dura opposite a mastoid antrum chronic suppuration, without the formation of free pus. In reality it is an extradural abscess, which is explained by the fact that the drainage through the ear was sufficient so as not to push the pus into the extradural space. The tegmen in these cases is usually necrosed, but granulations may appear on the dura opposite to a chronic infection without complete necrosis of the bone. In other words, if the mucous membrane is diseased or lifted from the bone, the toxins may pass through the haversian canals and fissures on the bone, as well as along blood and lymph vessels in the dura.

Tuberculosis and syphilis of the skull or dura are well known etiologic factors.

Symptoms.—The symptoms depend upon, first, the amount of pain the patient can endure from the mechanical irritation of the sensitive dura; second, the severity of the infection and the extent of the edema of the dura, and third, the degree of intracranial pressure.

In mechanical noninfective irritations of the dura, headache is the principal symptom. The pain is always localized in the same point and may radiate in all directions. By very hard pressure on the skull over the painful area, the pain may be greatly increased. The headache is increased when blood rushes to the head from mental exertion, after heavy meals, when fatigued, or at night when lying down. There may be mild projectile vomiting and dizziness during the paroxysms of extreme headache. The mind may be sluggish, and epileptoid spells may accompany the paroxysms of headache. The pulse, temperature and respirations, as well as the blood, are usually normal.

In the infective type of irritation, especially in acute cases, the symptoms are more pronounced. Acute mastoiditis or sinusitis are the most frequent cause. The discharge from the ear or sinus may suddenly stop or diminish, indicating that it may have ruptured into the extradural space. The headache, projectile vomiting and dizziness are more pronounced. The prostration is greater, although the patient may go about. He shows signs of sepsis. The mental symptoms are more pronounced in that the patient is indifferent to his surroundings. He may not ask for food, but if fed digests it. The patient is also slow in answering questions. When a large abscess or blood clot forms he may have hemiplegia and go into coma. , The temperature frequently drops to subnormal, as low as 96.5, and lingers between this and 100, no matter if the temperature of the patient was 104 before the abscess in the mastoid or sinuses broke into the extradural space. The pulse may drop to 50 or even less, depending upon the amount of intracranial pressure. The respirations may become as slow as 10 per minute in pronounced cases. The blood examination is almost without value, as there may be only a slight leukocytosis and at times an increase in the polys. Frequently the blood is normal. The blood pressure is increased. When the abscess makes enough pressure to loosen the dura a little further from the skull, the symptoms may suddenly become less severe for several hours only to reappear when the abscess becomes a little larger.

Extradural abscesses of otitic origin occasionally cause a paralysis of the external rectus of the same side, which occurred in three of my cases. Choked disc is occasionally found in patients with much edema of the dura or large extradural abscess.

Chronic infective irritation of the dura is due to chronic suppuration of the sinuses or mastoids. There is a chronic discharge from the sinus or ear, as the case may be, and the bone between these structures and the dura is necrosed so that granulations may be found on the dura. The bony wall may not be broken down, but the toxins may pass through the bone if the mucous membrane is diseased and form granulations on the dura. If the drainage is sufficient so as not to form an extradural retention of pus the symptoms of extradural irritation may be very mild. The pain is usually intermittent in these cases, depending largely upon the resistance offered to the pus in draining through the ear or sinus duct. It may be severe enough to keep the patient from work. On careful inquiry we find the patient has occasional spells of dizziness and mild manifestations of cerebral vomiting. The temperature lingers toward the subnormal, 97 to normal. The pulse is usually slow. Occasionally we find mental symptoms such as indifference to work or slow in answering questions. One patient of mine slept for thirty-six hours, waking up occasionally to eat and talk with his wife. Hard pressure over the area may or may not increase the pain, depending upon the strength of the bone over the area. If the patient is not operated upon, before death he will have a pulse of 120 instead of 50 and a temperature of 102 instead of normal, also respirations of 30 instead of 10, and the blood pressure 90 instead of 180. When this change has come about, it is too late to operate, as the patient will die.

The Abderhalden serologic test for intracranial lesions, as carried out by Dr. J. W. Retinger at the Durand Hospital for Infectious Diseases, seems to be of great diagnostic value. Dr. Rogers has had a number of cases in which Dr. Retinger made the Abderhalden test, and on operation Dr. Rogers found the findings of the Abderhalden correct in all cases. I have had the blood in one case tested by him in which he reported no lesions of the brain, but an irritation of the dura in the Braca's area on the left side, which corresponded to my diagnosis, and later I corroborated it by surgery.

Complications.—The complications are brain abscess, meningitis and thrombosis of the lateral or cavernous sinuses. If the abscess breaks very gradually through the dura and the toxins enter the subdural and subarachnoid spaces but become circumscribed, we have the symptoms of a leptomeningitis.

Treatment.—Extradural irritation, except when caused by syphilis, should be relieved by removing a plate of skull over the area involved. In mastoiditis accompanied with symptoms of extradural irritation I invariably expose the lateral sinus and the dura over the mastoid antrum. I expose both sufficiently to be able to make a thorough examination of the dura and sinus which at the same time establishes ample drainage.

In sinusitis of the frontal, ethmoids or sphenoid, I do a thorough intranasal operation and then keep the patient under close observation for a few days, taking the temperature, pulse and respiration every three hours. If the symptoms still persist, I do an external operation on the frontal sinus and remove the posterior wall as far as necessary to reach the abscess and thus expose the dura. The dura must never be opened in these cases, as going through an infected field would nearly always develop a meningitis.

VI.

CONTRIBUTION TO THE ETIOLOGY OF PERITONSILLAR ABSCESS: DENTAL ORIGIN.*

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Peritonsillar abscess is commonly considered to be of tonsillar origin. Some two years ago a number of cases came under my observation which strongly suggested an infection of a wisdom tooth as an origin. These cases had several characteristics in common. They were either accompanied or preceded by caries or inflammation due to delayed eruption and impaction of a wisdom tooth. In one case, that of a young woman, incision of the peritonsillar abscess admitted a probe which led to a sinus reaching to a subperiosteal cavity situated at the angle of the mandible. Another common characteristic was the location of the abscess. The pus collection did not point in the supratonsillar space but rather in the region of the base of the anterior pillar and somewhat lateral to it. The cases were also characterized by an excessive trismus, the patients being quite unable to separate their teeth at all. On attempting to open the mouth they would merely separate their lips, disclosing tightly shut teeth, between which it was barely possible to introduce a tongue depressor. Attempts to force the jaws apart were frustrated not so much by pain as by a muscular contraction, and the examination had to be conducted through the vestibule of the mouth.

This picture is not usually presented by the typical cases of peritonsillar abscess with typical localization in the supratonsillar fossa. In such cases the patients are unable to close their teeth firmly or to separate them widely, and they, therefore, keep the mouth partly open with saliva dribbling constantly.

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*Read before the Chicago Laryngological and Otological Society, April 7, 1919.

An attempt was made to secure data of the incidence of peritonsillar abscess with regard to age, in order to determine whether it in any degree coincided with the period of molar dentition; also as to the frequency of peritonsillar and tonsillar inflamation in the negro, since, as is well known, the greater development of their lower jaw renders them quite free from the accidents of molar pathology due to impaction and delayed eruption; also, the relative frequency of peritonsillar infections in the different sexes. This inquiry was not fruitful of results, owing to the fact that little could be found in the literature upon the subject. Hospital records were equally unilluminating. An attempt to obtain radiograms of peritonsillar abscess cases similarly yielded meager results, for the reason that no such studies were found in the literature or in hospital records available. Left to one's own resources with no X-ray laboratory available for clinical study, but a scant number could be obtained, too few to be of any value in this study.

I have made notations of a series of seventy-five cases of peritonsillar abscess. They were seen in private practice and by colleagues and myself at the infirmary. In few of them could a detailed history be secured. These cases usually present themselves at the height of their suffering. They have spent many sleepless nights, they have been unable to take any food for days, they are in constant pain radiating to the ears, teeth, throat and back of the head. They are unable to speak and cannot be questioned. All that can be done is to incise the abscess promptly and to evacuate the pus, and then the patients usually disappear as suddenly as they came, frequently without leaving any trace. However, the following data have been adduced: Fifty-nine cases were treated at the infirmary from 1915-17. Of these, forty-eight were males and eleven females.

As to age, there were in the first decade five, or 9 per cent; in the second decade, fourteen or 24 per cent; in the third decade, twenty-eight, or 50 per cent; in the fourth decade, nine, or 15 per cent; in the fifth decade, two, or 3 per cent;

in the sixth decade, one, or 1½ per cent. About 75 per cent of the cases occurred in the second and third decades of life, a period fairly coinciding with molar dentition, and the maximum of prevalence being in the third molar period. Of the sixteen cases seen in private practice, twelve were females and four males; all but one were between the ages of fifteen and thirty, or 95 per cent in the period of wisdom tooth eruption.

It may, of course, be truthfully argued that the period indicated is also characterized by the prevalence of tonsillar infections which are the accepted source of the pathologic process. It will not be sufficient to say that the curve of tonsillar infections reaches its highest point in the first decade of life, whereas, that of the peritonsillar infections reaches its highest point in the third decade of life. This is true only of acute tonsillitis. The chronic cryptic forms really attain their greatest prevalence in the third decade of life, and it is the chronic cryptic forms that are concerned with the etiology of peritonsillar inflammations.

The figures quoted above need not be necessarily without significance, especially if borne out by more extensive statistics. Three out of sixteen cases, or 20 per cent, were unmistakably of dental origin. One, a woman of thirty years, with caries of a last lower molar, had a large abscess displacing the right tonsil, involving the parotid and cervical glands and pointing outwardly below the angle of the jaw. Another case followed the extraction of a lower wisdom tooth. The patient presented herself with marked trismus. The examination had to be made through the vestibule of the mouth, which was somewhat facilitated by the absence of another molar in the upper jaw. Partly by inspection and partly by palpation with the finger and probe a fluctuating swelling was discovered dislocating the right tonsil towards the midline, and presenting anteriorly between the missing molars. An incision was made close to the ascending ramus in the direction of the angle of the jaw and pus evacuated. In another case, after evacuating the abscess, a sinus led to a subperiosteal cavity at the ascending ramus, which could be explored by a probe. Five other cases, or 33 per cent, had carious wisdom teeth and gave a history of previous attacks of alveolar abscess. In over 50 per cent of the cases the dental etiology seemed to be either a principal or a contributing factor.

Moritz Schmidt finds peritonsillar abscess more common than the tonsillar. He gives accumulations in the tonsil crypts first place in the etiology; next, streptococcic invasion from badly suppurating teeth. Koehler finds a suppurating wisdom tooth the most fruitful cause of abscess in or around the tonsil. Cryptic accumulations come next in his opinion. Sokolowsky and Dmoschowsky point out that peritonsillar as well as tonsillar abscess occasionally follows operative procedures on the nose, irrespective of antiseptic precautions. Of special interest is their assigning chronic suppurative otitis media as a causative factor in tonsillar and peritonsillar inflammations, particularly of the recurrent type. Such patients will sometimes give the history of a nauseous sweetish taste in the mouth caused by the pus of the middle ear reaching the pharynx by way of the eustachian tubes and in this way infecting the tonsils and peritonsillar region. Victor Lange, of Kopenhagen, considers simple angina as a most frequent cause of tonsillar and peritonsillar affections. For early diagnosis the author points out that rapid development, unilateral involvement, early and extensive edematous infiltration of the uvula and anterior pillar herald the development of peritonsillar abscess. Early appearance of edema points to deep seated inflammation with congestive phenomena. The abscess is usually contained in the anterior pillar. It may also occur posteriorly. Occasionally the pus is discovered above the last lower molar. Casselberry considered chronic cryptic tonsillitis as the usual cause of peritonsillar abscess and calls attention to its frequent association with a hereditary rheumatic habit and not infrequently with acute rheumatism.

Owing to the paucity of material gleaned from the literature and owing to lack of facilities for anatomic, clinical, bacteriologic and radiologic study, the writer for a long time lost interest in the subject. Recently, however, there came to his attention an extensive and elaborate study in a French dental journal, *Odontologie,* volume 41, by M. A. Gibert, of Carmeux, entitled "L'abces periostique juxta amygdalien odontogene." Here, at last, seemed to be found something pertinent to the subject. After citing observations similar to those referred to, the author differentiates between peritonsillar and juxtatonsillar abscess. To the latter he assigns an almost invariably dental origin. Juxtatonsillar, I believe, may be rendered in plainer English as paratonsillar. We have therefore to distinguish, according to this author, between peri- and paratonsillar abscess.

The principal anatomic landmarks forming the basis of this distinction are the internal pterygoid muscle and its insertion in the ascending ramus of the mandible. Medially this muscle is in relation with the superior constrictor which in turn is in relation with the tonsil. The pterygomaxillary ligament is the common origin of the buccinator and superior constrictor muscles. A tract of cellular tissue connects the pterygomandibular and pterygoconstrictor spaces and brings them in relation with the prestyloid region. (Fig. 1 and 2.) Laterally the internal pterygoid is in relation with the dental artery and the dental and lingual nerves. (Fig. 2.) A peritonsillar abscess is located between the tonsil and the superior constrictor. It is of tonsillar origin and principally the superior pole of the tonsil which contains the largest and most submerged crypts is the most frequent source of infection. The pus therefore collects in the supratonsillar space, for the added reason that in that portion the tonsil is least firmly attached to the surrounding tsisues. The paratonsillar abscess, on the other hand, is of wisdom tooth origin. The space delimited by the insertion of internal pterygoid and ascending ramus of the mandible is considered by this author to be in a state of enhanced susceptibility to infection, on account of congestion and physiologic proliferation incident to delayed eruption, impaction and caries of the last molar, and sometimes of the second and first molar, observed in the white race. The situation of the third molar within the ascending ramus in the Europeans favors the extension of a wisdom tooth infection in the direction of the periosteum of that portion of the bone and frequently develops in a phlegmonous periostitis. Such an abscess is situated between ascending ramus of the lower maxilla and the internal pterygoid muscle. As the collection expands it pushes the internal pterygoid against the superior constrictor and thus the tonsil is displaced towards the median line of the fauces. At the same time the abscess grows forward and points in the region of the pterygomaxillary ligament which presents itself as a soft red cushion at the intermolar angle and thus marks the site for the therapeutic incision. (Fig. 3.)

The abscess thus situated is in relation above with the parotid gland and temporomaxillary articulation which it may involve. It is also in relation with the dental and lingual nerves. The abscess may also extend by way of a cellular tract around the anterior border of the internal pterygoid, invade the cellular space between the latter muscle and the superior constrictor and thus also reach the prestyloid region. Very rarely the pus may burrow towards the mouth and pass through the tonsil. It may also burrow over or under the mylohyoid muscle and provoke a phlegmon of the floor of the mouth or anterior part of the neck, leaving quite frequently one or more fistulæ which persist for a long time.

It is thus seen that this condition, starting from a carious or impacted last molar and acting upon a region of physiologic predisposition to infection, results, first in a limited phlegmonous periostitis which by reason of the peculiar relations may progressively involve the entire side of the neck and face, presenting a combination of many lesions, a peritonsillitis, parotitis, temporomaxillary artritis and phlegmonous adenitis. From these conditions it is to be differentiated according to the author, by adducing a history of premonitory dental pain, followed by an interval of quiescence, then by the development of a periosteal inflammation of the ascending ramus involving the bone and early giving rise to maxillopharyngoglossodental pain, through the involvement of the dental and lingual nerves, to dysphagia and to a marked trismus which cannot be relaxed by chloroform. Later the pointing of the abscess above the last lower molar corroborates the dental origin.

Résumé.—The object of this thesis is to call attention to the significant relation of the period of wisdom tooth eruption to various tonsillar and peritonsillar infections and to present the very interesting differentiation by Gibert of peri- and paratonsillar abscess.

25 E. Washington St.

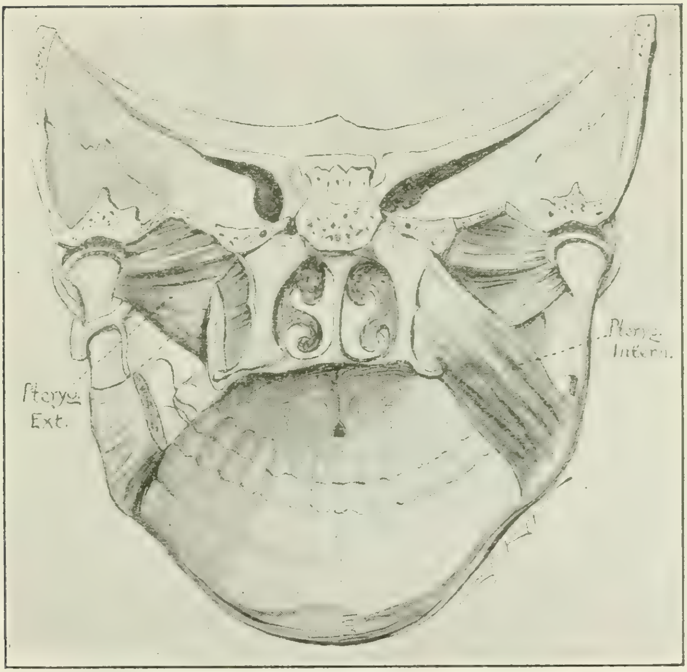
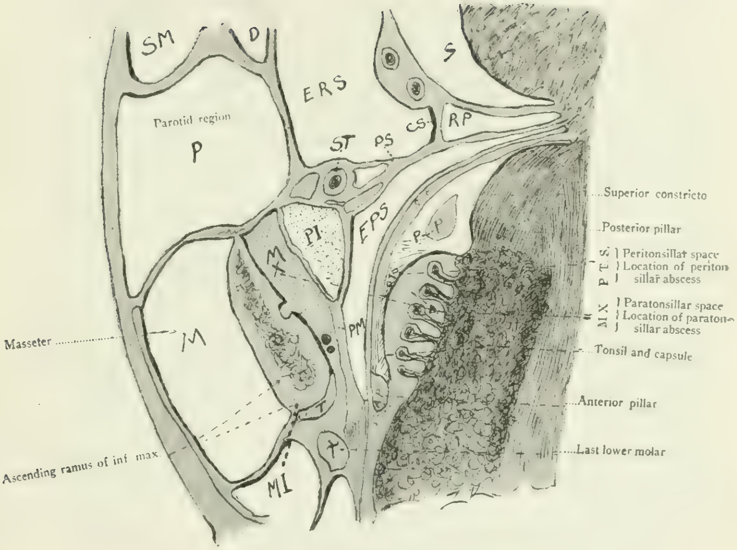


Figure 1.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Parotid region
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Ascending ramus of inf max.
Superior constricto
Posterior pillar
P.T.S.
Peritonsillar space
Location of peritonsillar abscess
M.X.
Paratonsillar space
Location of paratonsillar abscess
Tonsil and capsule
Anterior pillar
Last lower molar

Figure 2.

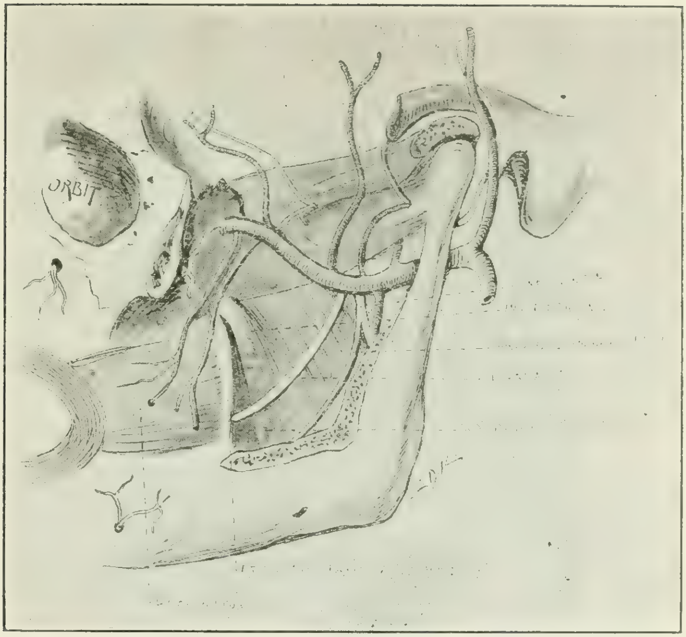

Figure 3.

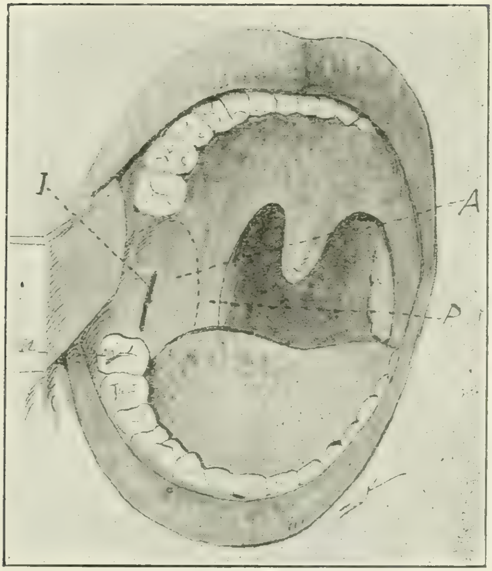

Figure 4.

VII.

RECURRENT CALCULUS OF THE TONSIL. REPORT OF A CASE.*

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NEW HAVEN, CONN.

Take it all in all, calculus of the tonsil has been, in the experience of the writer, not of very frequent occurrence. The cases I have met have been without any special symptoms other than slight soreness or disturbance in the tonsil, and in looking through the crypts of the tonsils carefully I have, by merest accident, discovered the presence of the concretions and removed them. Such calculi may be no larger than the average allspice, and several that I have happened to take out have been similar in appearance, possessing rough surfaces, some of them quite corrugated, like the one that will go around in the box with the larger specimens, and these have been correspondingly difficult to remove on account of this rough exterior.

The case which forms the basis of the report came to see me first in the year 1904. She said that some ten or fifteen years previously—as a matter of fact, in the year 1890—she had consulted Doctor Chapman (who was a member of this society) and that he had removed from her quite an accumulation, from the right tonsil; and she said that she thought her symptoms now were similar to what they were at that time.

She evidently was suffering a good deal of pain and discomfort; the glands in the neck were somewhat enlarged and tender; and it certainly hurt her to swallow, quite exquisitely. She was a woman then of fifty-seven years of age, small of stature, and had otherwise nothing in her history that was remarkable as bearing upon the present ailment. She was not subject to serious attacks of sore throat, except as at present, and the previous one when Dr. Chapman saw her.

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*Read before the forty-first congress of the American Laryngological Association, June 16, 1919.

On looking into her throat I found the right tonsil apparently covered with a gray exudate. The tonsil was very much swollen, very red, the anterior of the pillar of the palate being edematous. On wiping off the gray exudate from the surface with peroxid, my cotton caught in what proved to be the calculus. Immediately I discovered what it was, and after cocainization proceeded to remove it. It was composed of three fragments, which have been held together by threads in order to show the relative positions that they occupied, and to get a good photograph.

With effort I was able to remove the first fragment, the one to the left, as they are now bound together. Considerable bleeding followed it, and in spite of the cocain the pain was considerable. After the bleeding has ceased, to my surprise there was a second piece visible, and the third came to light later on and was also removed, the rough surfaces being very tightly, closely and intimately imbedded in the substance of the cavity wherein they were located. This made it very difficult to get them out, and the bleeding which followed was not inconsiderable. It occurred to me, as I talked with the patient while waiting for the bleeding to cease, that, as she had had a similar concretion, which was not an inconsiderable one, removed fourteen or fifteen years previously, there might be some connection between the lining membrane of this sac and the production of the calculi, the idea having been impressed upon me in a way similar to that in which the biliary calculi form in the walls of the gall bladder. I therefore especially requested the patient to come back as soon as she could, in order that I might have a chance to more carefully examine the lining of this sac, than I was able to do then on account of the bleeding. The patient was instructed to use simple saline gargles, and to report not later than a week. She carefully forgot the latter part of my instructions, and I did not set eyes on her again at that time. Having forgotten her name, by one of those slips that occur in the life of a busy practitioner, I was not able, by writing to her, to urge her to come again and thus settle in my mind the cause of the trouble.

I saw this patient again on the 22nd of July of last year, after fifteen years, an exceedingly hot day, when she had reached the age of seventy-two, and was in physical condition to be very much depressed by the heat and the exertion of getting in to see me. She seemed very frail and was suffering a good deal of pain. Recognizing her immediately as she came in, I said, "Well, have you got another stone for me?" She said, "I think so, Doctor," and she was right. I looked in her throat, and asked her how long she had been aware of the present accumulation, which one readily saw in the same tonsil and in the same pocket where the previous one had been. She said that for the last two months she had been gradually having more and more pain, until now it seemed as though she could not stand it any longer, and she had to come in. Anyone who saw her throat would agree that she had certainly borne up bravely under the torment, and the impression that one received on looking into the throat was that he wanted to be careful that the stone did not fall out while he was getting the instruments ready to properly remove it. But mindful of the rough surface which held the previous one securely in place, I carefully applied the cocain again, with plenty of adrenalin, applying both, in order, if possible, to forestall a hemorrhage, and then was able to remove it this time as a single stone. The cavity again bled profusely, in spite of the substances applied, and I again found nothing but a rough, bleeding, granulating surface, to which I applied some ferripyrin, and again besought her to put in an appearance before many days—in fact, gave her an appointment for exactly one week from date, as on the next day thereafter I was going on my vacation.

She asked if she might take the stone home with her, and I told her if she would be careful to preserve it in its integrity and be sure to return it when she came back in a week, I would gladly let her take it. Asking her why she particularly wanted to take home this specimen when she did not express any desire to take home the previous specimen, she said her folks thought she was making an awful lot of fuss about her throat and she wanted to take it home and show them what she did have there.

I was glad to have her show her friends and relatives that she was a sufferer from a genuine error and not a delusion, and she then related to me that I was right in thinking that she did not feel well that day. She said she had not been able to have any help this summer on the farm, and before coming over she had gotten up and milked three cows, done the chores about the place, and then hitched up her horse and driven six miles so as to get to the station in time for the train, and she "did feel kind of tired that afternoon, she was sure." She also related what is perhaps more interesting from a scientific standpoint, that in the year 1910 she had brought forth another stone, while in the Hartford hospital for an operation for gall stones. This specimen I have not been able to find, although the patient, after seeing both of them, says it was similar in size and shape to the one last removed.

The patient again carefully forgot my instructions to return in a week or to bring in the stone, and I went away on my vacation as scheduled. On returning in September, I wrote her that I would like the stone at least, and would like her to bring it in, in order that I might see how the cavity looked. By that time the tonsil had returned to normal proportions, which consisted of a very thin layer of lymphoid tissue lining the right tonsil fossa. The cavity which had been occupied by the stone was smooth and intact, and presented nothing peculiar about its surface to distinguish it from any other tonsil crypt of a woman of her age. There was no evidence of calculus formation here at this time, although the cavity did contain a little of the ordinary cheesy secretion which one finds in old tonsils. She rather wisely concluded that if she did not have these things occur oftener than once in eight, ten or fifteen years, she would not require a complete tonsillectomy or other form of treatment, and that if ever she got another one of these accumulations she would be only too glad to have me add it to my collection. And so the history of the case ceases for the present.

Whether in years to come I shall have the privilege of bringing before you another specimen remains to be seen.

In these specimens, as you see them, certain crumbs have broken off, and their study seems to show nothing different from the usual combination of phosphates and carbonates that one finds in calculi that occur in the mouth and salivary glands.

In commenting on this report it is perhaps worth while mentioning that while larger—much larger—calculi have been reported, these particular specimens are so large that they outstrip any of those usually found. The first one removed is peculiar in that it is composed of three parts which, by the act of swallowing and other motions of the tissues surrounding them, have had the contiguous surfaces smoothed off into facets exactly like those found on gall stones.

The fact that this patient had also biliary calculi is interesting, as indicating the tendency of her secretions to give up their salts to make solid concretions, explaining in a way the occurrence of at least four of these large masses in her case.

If ever another case should occur of a "repeater" of this type, two ways suggest themselves to dispose of such a tendency, either to destroy the living of the cavity or pouch in which they reform (as I wished to do for this patient, only she rejected the offer) or to do a complete enucleation. This second alternative would dispose of any tendency to return.

Perhaps, after all, as we contemplate a mass of the size of these before us, its greatest interest centers around the possibility of unexpectedly meeting such a hard substance when operating where the stone is entirely concealed in the midst of the tonsil tissues.

In the days long past, in the good old days of the tonsillotome, such a stone would have been most disturbing. Only once did I meet such, and then cut through squarely a small accumulation. Operating by the present methods would cause but little trouble, because the dissecting wire of the snare would usually—perhaps always—go outside the mass, as it shells the tonsil out of the capsule.

If we should meet the rare but by no means to be ignored complication of an elongated styloid process, I imagine that it would likewise either be chopped by the snare, or again, the latter would glide off from it.

I have sometimes wondered if the smaller stony masses may not lead to abscess formation. I once found gritty material in a small abscess in the tonsil substance proper where there was no history of an immediately acute process to account for a quinsy, and I can conceive of an infection forming an abscess in the area irritated by the presence of a stone. Then in the pus thus formed a friable stone could readily become dissolved or broken up, a thing which presumably occurs in the case of salivary calculi of small stature.

In the case of this particular patient, I presume that if she could have longer endured the pain and soreness, ultimately these concretions would have fallen out into the mouth, readily being swallowed, unless by choking inspired into the trachea. Even Dr. Jackson's extensive collection of foreign bodies in the bronchial tree, I presume, does not include such an intruder, effectively disposing this hypothesis; for what Jackson has not found, indeed, is well nigh unheard of.

195 Church St.

VIII.

SYPHILIS AMONG THE NEGROES OF AFRICA AND ITS MANIFESTATIONS IN OTORHINOLARYNGOLOGY.*

By J. N. Roy, M. D.,

PHYSICIAN TO THE HOTEL DIEU, MONTREAL. LATE SPECIAL DELEGATE OF THE CANADIAN GOVERNMENT. LAUREATE OF THE ACADEMY OF MEDICINE OF FRANCE.

The study of syphilis in Africa is particularly interesting, as it shows that this affection—previously unknown among the negroes of this country—has been transmitted to them, at different epochs, by the Egyptians, the Arabs, the Berbers, the Europeans and the Hindoos. Besides, its manifestations among them are very irregular, as at certain places the symptoms are almost imperceptible, while at others they take a very serious character.

An extended trip around the Dark Continent, where I had the occasion of visiting twenty-two different colonies, some of them located far away from the coast, has given me the opportunity of examining five thousand negroes, and it is the result of my observations that I want to mention briefly. In general, there is no syphilis among the natives who live in the deep forest or at places unfrequented by travelers, but it is very common on the north and south and on the eastern and western coasts. The aborigines, to whom this terrible affection was unknown, have given it different names, and the Zulus of the Natal have called it "the white man's disease."

As I have already said in a previous paper,[1] much has been written about the origin of pox. However, it is not my aim to sum up the different theories here; I will content myself with merely stating the principal ones in connection with the subject I am treating.

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*Read before the Congres Francais d'oto-rhino-laryngologie, Paris, May, 1919.

According to the opinion expressed by Sydenham, Haller and later by Sprengel (1796), Africa was the primary center of syphilis, which next came to Europe. In my opinion, this hypothesis is incomplete for, if I am ready to accept it in part, I must reject it as a fundamental idea. Indeed, it is generally admitted that Asia was the cradle of this affection, and that it existed in the East Indies from a very early date. The Ethiopians, and above all the Egyptians, in daily contact with the people dwelling on the coast of the Red Sea, and the Levant, were naturally all exposed to the contagion. Moreover, the first Arabian conquerers, syphilized for a long time back, established themselves definitely in Northern Africa during the seventh century, by repulsing the Berbers or by mingling with them. In 711, the Moors invaded the south of Spain, which they occupied for more than seven hundred years, and during this period bands of natives were constantly crossing the Strait of Gibraltar.

In Europe, we can say that the history of pox dates chiefly from 1493, the epoch at which Christopher Columbus returned from his first voyage to America. I will not discuss the opinions expressed on the probabilities of the importation or exportation of this disease by the sailors of the intrepid Genoese navigator. I will content myself with merely recalling that in South America the specific lesions have been observed in the skeletons of Indians who inhabited the country before the Spanish conquest. Moreover, as I have already intimated in another article,[2] to me the Redskins are Mongols who crossed Bering Strait and peopled this vast continent. And besides, it is admitted that the Chinese have been syphilitic for an indefinite period.

As we have been able to note, the negroes have not yet been brought into the case, and it is necessary to consult the most recent works in order to find a more precise hypothesis. Mühry (1856) thinks that syphilis was imported from tropical Africa to Portugal in the fourteenth century, during the reign of King Henry the Navigator. I am unable to share this opinion, because, in all the Dark Continent it is exactly in the periequatorial region that syphilis is least common and its hereditary manifestations are exceedingly rare. Moreover, in the great forest this affection was unknown before the arrival of Europeans. Without going further into details, I think that the long sojourn of the Moors in Spain, driven from Andalusia in 1492 by Ferdinand and Isabella, has contributed largely toward syphilizing this part of Europe, even before the return of Columbus.

I believe that in Africa syphilis appeared first in the northern part, and that it has been imported from Asia. The Arabs and the Berbers contaminated the Moors of Mauretania, and these infected the blacks of the surrounding countries. From the mingling of the negroes with the Fellahs of Egypt were born the Peuhls, who inhabited the region of Upper Senegal-Niger, and the Foulahs, who are met with especially at Fouta-Djalon in French Guinea. In the British colonies these Foulahs, called Fellanies, brought under their domination the powerful tribe of the Haoussas, who lived in the northwestern part of the English Nigeria. These, in contact with their victors, were not long to take the pox. Also, these Haoussas, these Foulahs-Fellanies and these Peuhls, who were extremely syphilized and always traveling, transmitted their disease in all the places they went.

Syphilis has been imported in Abyssinia by two different ways: first by the Egyptians, always at war with the Ethiopians, and next by the Arabs of Asia. These Arabs, coming from Yemen, invaded Erythrae and the Somali Coast, and going south they took possession of Harar, the capital of the country of the Gallas, where they remained during a very long time. Their civilization has left certain customs, which are still found there today. H. Blanc thinks that the Ethiopians were contaminated by the Portuguese during the fifteenth century. Surely at this period syphilis already existed in Portugal and had also, for a long time back, shown itself in Ethiopia.

English East Africa was infected chiefly by Hindoos, who are also met with in Zanzibar and in Natal.

Portuguese East Africa and Angola were contaminated by the Portuguese, and especially this last colony, which is possessed by them since over four hundred years.

The blacks of South Africa have been syphilized principally by the soldiers who have taken part in the wars of that country. The comparatively recent British-Boer war was one which brought about the greatest ravages in this respect. There is no reason to be astonished at this, for it is an acknowledged fact that amongst all the European troops the British army is affected by venereal diseases to an extent three times greater than other armies, and particularly by pox. Moreover, history teaches us that in all times, armies have been one of the principal agents that have spread this affection.

The great mining centers are infected not only with syphilis, but also with tuberculosis, and the Kaffirs, although of robust physique, succumb to phthisis with disconcerting rapidity.

Researches concerning pox amongst the Hottentots and the Bushmen would have been of particular interest. Indeed, as I have already written in a previous paper,[3] these two tribes, which have now become almost extinct, have in their veins a certain quantity of Mongol blood, and it is recognized that the yellow race is strongly affected with this malady. Unfortunately, these two peoples, owing to their timid and unsociable character, do not comply themselves for examination, and as they dwell on the frontiers of German Southwest Africa, in Portuguese Angola, and on the frontiers of the surrounding British colonies, it is very difficult to reach them and make a study of a sufficient number to form an opinion.

For quite a number of years now, Europeans have divided between themselves practically the whole continent of Africa, and with the construction of railways and the organization of steamboat services, it is an easy matter for the natives to travel from place to place and communicate the diseases by which they are affected. The negro soldiers who constitute the native forces, when they are transferred from one colony to another of the same country, obviously add to the danger of contagion if they are syphilitic.

And now if, in addition to all that I have described, I mention the scattered cases of pox transmitted by Europeans not yet named, we are forced to admit that the malady was introduced into Africa at numerous places and at different periods.

As already remarked, I have, in another communication, exposed the pathology of the eye due to syphilis amongst the aborigines of Africa. In the present paper I propose to treat of the manner in which this disease affects the nose, the throat and the ears. During my sojourn on the Dark Continent

I had opportunity to observe one hundred and thirty-five cases of pox, the different manifestations of which I found very interesting. In the first place, I was struck by the mildness with which the affection attached itself to certain races as compared with the extreme gravity with which it attacked other tribes. The Moors of Mauretania, the Peuhls, the Foulahs-Fellanies and the Abyssinians, who were infected several centuries back, very seldom show lesions on the bones, whereas an injury of this character is frequently observed amongst negroes who have been more recently syphilized. In a general way, the negroes are very neglectful in taking care of themselves, or do not treat their maladies, and amongst the former very slight treatment usually removes the symptoms of the pox. Hence I believe these negroes, contaminated many generations ago, now possess a certain degre of immunity against syphilis, which explains why this affection is so appreciably attenuated amongst them. Moreover, I have made similar observations amongst the Chinese and the Redskins of South America, who, although infected ages ago, have now very mild specific manifestations of the disease.

According to Livingstone (1857), there was no form of pox persisting amongst the pure blooded native races of Central Africa; on the contrary, it showed itself amongst populations of mixed breeds. Certain authors are inclined to believe that if this fact could be verified by prolonged observations it would force an admission that immunity belonged much more to the race than to the climate. For myself I have to note that this Scotch missionary was impressed by the considerable number of syphilized mulattoes who were to be met with in the large cities of South Africa. Once in the interior of the country, observing that affection no longer, he concluded therefrom that the negroes living in the center of the Dark Continent were more or less refractory and that syphilis was invariably cured without leaving any trace. I will not delay to say that this is not so with the pox in its ordinary course. That malady did not exist amongst the negroes of the great forest before the arrival of the first European explorers, and even now it is very rare. With regard to immunity, I accept what has been submitted, and I do so all the more voluntarily because it forms part of my theory, but only amongst syphilized peoples for several generations past. Furthermore, I believe immunity can be met with among all nations, and the climate has nothing to do with it.

The milder form of syphilis, none the less, is terrible in its menace to foreign races that have not been contaminated. When those races become infected the manifestations develop with great recrudescence. Europeans particularly are exposed to the bad effects of pox contracted outside their own country, especially if this affection is taken in Africa, Mexico or in China. I have seen at Konakry, in French Guinea, a large number of Soussous, who were syphilized by the Foulahs after the construction of the railway line which runs from the coast and traverses the Fouta-Djalon, showing large perforations of the palate and of the nasal septum. Amongst other subjects, the pox made its presence felt on the larger bones, notably the tibias. These Soussous, a race primitively healthy, suffered to a very large extent from contact with their neighbors, the Foulahs. The same phenomenon attracted my attention amongst the Yorubas and the Egbas of Nigeria, who were infected by the Haoussas, and amongst the Somalis, who are commencing now to be contaminated by the Ethiopians, owing to the railway which enables them to reach Abyssinia easily.

Among the one hundred and thirty-five cases of syphilis I am speaking of, I found seventeen perforations of the nasal septum, nine perforations of the palate, and twelve patients which presented the two symptoms at the same time. Twenty other cases had lesions on the bones. I will not delay to describe the alterations, more or less considerable, of the mucous membrane of the mouth in the second stage of the pox, as these present no interest.

The mucous membrane of the larynx is very resistant to infection, and I have observed only two cases of specific laryngitis. As to tuberculosis and cancer, it is exceedingly rare to see these maladies invade that organ.

I have never found paralysis of the vocal cords or of the velum palatum, for the negroes are not inclined towards syphilitic nervous manifestations, cerebral or spinal. As they have no intellectual preoccupations, and they live a very simple material life, the pox localizes itself amongst them principally on the bones and mucous membranes. Perspiring freely and being constantly exposed to the sun, with very little clothing, their irritated skin is also often affected.

Before proceeding to discuss the question of the ears, I wish to say a few words about a singular malady that has been encountered in the Belgian Congo called "Mulandala" by the natives who, in the region of Kasai, suffer very severely from the complaint. Dr. Yale Massey, of Lusambo, informed me that he had seen, on a man forty years of age, and a woman, thirty-five years of age—both belonging to the tribe of the Balubas—a large perforation of the palate, and the complete destruction of the nasal septum, without other complications. A most attentive and thorough examination was made, but the doctor was not able to ascertain the cause of the affection. A biopsy was made, but the microscope revealed nothing particular, except inflammatory lesions. Mercury, iodid of potassium and arsenic, prescribed in large doses, produced no effect, and both negroes died of cachexia in the same year that the malady developed.

It appears that in Nigeria the same disease, called "Majakara" by the negroes of that country, was seen also amongst the Jebous. It seems to attack people mostly between twenty-five and forty years of age. Mercury, iodid of potassium and arsenic were likewise administered in these instances, but without effect, and the disease progressed until the patient's death.

It would be difficult to submit an hypothesis as to the probable cause of this affection. Syphilis, tuberculosis, malignant tumors of the palate—about which I have already made one observation[4]—actinomycosis and leprosy are too well known to have appeared without being recognized. The microscope having revealed nothing special, and the medicaments prescribed having caused no amelioration, it has to be admitted that we are in the presence of an affection the etiology of which we do not yet know, as, for example, that of "Goundou," which I have seen and operated on in the Ivory Coast and the Gold Coast, and of which I propose to treat in a subsequent work.

At the time of my physiologic researches regarding the organs of the senses amongst the natives of the Dark Continent, I was impressed by the excellence of their sight and hearing. Their osseous and aerial perception is much superior to that of white people, and the Redskins who, in my opinion, belong to the yellow race, occupy an intermediate place.

The pathology of the ear amongst the negroes and Indians is not very extensive. I have observed but very rare cases of deafness having been produced by otitis sclerosa. I may also add that the arteriosclerosis amongst the two peoples is exceedingly rare. However, the mulattoes and the half breeds are just as subject to deafness as white people.

In Africa otitis is met with from time to time, and the malady varies as the places are more or less cold. Proportionately, infection of the middle ear causes mastoid complications more often among Europeans than among negroes. This phenomena is probably due to the anatomic fact that the eustachian tube of the negroes is larger than that of white people, and owing to that fact the ear has a better chance to empty itself.

I never saw any lesions of the labyrinth, either syphilitic or any other kind, and although the natives frequently suffer specific inflammation of the bones, their temporal bone never seems to be affected.

To sum up, I shall say that Africa was not the primitive cradle of syphilis. In the beginning, that malady was imported from Asia and propagated among the people who dwelt in the north and northeast of this continent. The people who lived on the coast of the Mediterranean then contaminated their neighbors to the south, namely, the negroes. Later, and at different periods, the pox made its appearance in other parts of Africa, starting at the coast.

Europeans are largely responsible for the invasion of pox in their respective colonies, and chiefly those who have been often at war.

A number of tribes that were first affected several centuries ago seem now to present a certain degree of immunity against syphilis, which appears always in a mild form; but it manifests itself with marked recrudescence among the people whom these tribes contaminate. Furthermore, it is admitted that the pox assumes a character of particular gravity when it is transmitted by the mixing of races, especialy if it is communicated to people who were originally indemnified.

This affection, among the blacks, localizes itself on the skin, mucous membrane and bones, but as far as my knowledge goes, the nervous system is not affected.

Lesions of the nose and throat happen frequently; the larynx is affected more rarely; and syphilitic manifestations on the ear do not seem to exist.

*Read before the Congrès Francais d'Oto-rhino-laryngologie, Paris, May, 1919.

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IX.

THE DIAGNOSIS AND TREATMENT OF LATENT ANTRUM DISEASE.

By H. B. Lemere, M. D.,

Omaha, Nebraska.

In the title of my paper I use the term "latent antrum disease." The word "latent" is used by me in this connection to specify antrum infections which are obscure and do not have the outstanding symptoms of either acute or chronic antrum disease. These obscure cases are generally low grade infections, yet some show recurrent acute exacerbations when the condition becomes very evident and is no longer obscure.

In the diagnosis of these conditions I have found transillumination very unsatisfactory. With an antrum full of opaque pus the shadow from the lamp is very decided. With these low grade infections there is often only an infected mucous membrane with very little free pus and no definite shadow is produced. One of the standard signs of antrum disease, viz., shadow or transillumination, is therefore lacking.

In searching for focal infections I have made a routine practice for some time past to examine carefully skiagraphs of the nasal accessory sinuses. The pictures are taken in different directions and each serves as a control on the others. I have a lighting cabinet in my office, and I examine the plates personally, comparing my findings with the diagnosis from the radiologist and with my own clinical observations. After over a year of careful study in this manner I have come to the conclusion that there are many infected antra which I formerly did not recognize. I have no doubt that with the vast improvement in radiology and with its increased employment that many men are also discovering these low grade infections, but unfortunately attention has not been called to the importance of their discovery and treatment nor have they received any definite classification. They are often not recognized, because the two classic diagnostic signs of a dark shadow by transillumination and of pus under the middle turbinate are often absent.

I have already referred to the unreliability of transillumination. It often fails because the secretion is of a glairy translucent consistency which does not show in transmitted light but which shows a definite shadow with the X-ray. This glairy pus, on account of its translucency, is often hard to distinguish in examination of the nose, either by anterior or posterior rhinoscopy.

In the diagnosis of nasal sinus infections, I have learned to rely very greatly on the condition of that lymphatic tissue in the pharynx lying in a vertical streak immediately posterior to the posterior pillar fauces. When infected secretion is being drained into the pharynx this tissue becomes acutely congested and stands out as a decidedly red swollen band and this always means either acute or chronic nasal infection.

In studying the skiagraphs if only those cavities are considered diseased which show a markedly opaque shadow, there will be many foci of infection passed over. I classify my shadows as clear, questionable, cloudy and opaque. I have at least three plates taken in different positions. In determining the degree of opacity, the antrum shadows are compared not only with each other, but also with the density of the other nasal accessory cavities. Each picture is considered a control on the others, and under these conditions a slight degree of cloudiness shown in every position has an intensified significance, and when combined with the enlargement of the pharyngeal lymphatic pillar it is diagnostic of a low grade infection.

The importance of these low grade antrum cases lies in the general or remote symptoms resulting from them. Many of them have no localized pain or even discomfort from the discharge, and there is little to call attention directly to the antrum. The symptoms are remote and are those which are becoming more and more recognized as due to focal infections. The most important of these which have appeared in my cases have been generalized headache, neurasthenic symptoms, anemia, chorioretinitis, catarrhal otitis media, otosclerosis, cardiovascular and nephritic changes. The subjective localized symptoms of pain, etc., referable to the antrum itself are often entirely absent.

The treatment is necessarily operative, and only in those cardiovascular cases in which operation must be excluded are we justified in simply removing swollen middle turbinates and polyps and attempts at drainage by nasal washes and sprays.

An antrum once chronicly infected cannot be restored to health except by drainage instituted by operation. The operative procedures for antral conditions described in the textbooks and in general use I find generally either too radical or not efficient. The Caldwell-Luc and the still more radical obliterating operations are far too radical and are not intended for the mild grades of antral infection I have described. A strong objection to an extensive operation is the length of time it necessarily consumes even with a skilled operator. Many of these cases of obscure antrum disease are being operated upon because the continuous source of infection has produced a very unstable nervous condition or cardiovascular or nephritic changes so that a short operation with shock at the minimum is imperative. The radical operations do not come under these requirements. On the other hand, it seems to me that the intranasal operation requires a large amount of cocain and the anesthetic effect on the inner wall is uncertain, so that the patient is frequently in such a nervous condition from the effects of the cocain and from the pain that the operation is completed with an insufficient opening. It is also generally necessary to amputate the anterior third of the inferior turbinate not only to provide room for operation but to render possible subsequent irrigations which would otherwise be difficult and painful. The sensitiveness of the nose after the intranasal operation and the lack of any external patent opening remaining after the external operation make irrigation of the antrum difficult and painful till the reaction of the operations has subsided. I consider this a decided disadvantage. My procedure is not new and no originality is claimed for it. The purpose is (1): An operation with the minimum amount of shock; (2) A permanent free opening into the nose; (3) Means of carrying out constant irrigation in a manner painless to the patient. The following is a brief description of the means taken to attain these ends:

Ether anesthesia is used, commencing with a mask and continuing with Beck-Mueller ether apparatus with the mouthpiece. A large retractor elevates the upper lip and a horizontal incision one inch long is made in the line of the junction of the mucous membrane of the gums and the cheek and immediately over the anterior wall of the antrum. The periosteum is raised. A Hudson drill is used to enter the antrum from its anterior wall. By using the second sized burr the hole is made half an inch in diameter and is sufficiently large for instrumentation. A medium sized round spoon mastoid curette is introduced through this anterior opening and an opening made low in the nasal wall one-half an inch in front of the posterior limit. Forward cutting forceps are now used to cut the opening forward as far as possible, always hugging the floor. A large spoon is used finally to finish off the opening. A perforated tube is now introduced through the oral opening and tied in place with one suture, which also closes the incision in the mucous membrane. This tube is long enough to extend out of the mouth. The whole procedure takes usually about five minutes, and the postoperative shock and depression is usually not nearly so severe as from a tonsil operation. On account of the obstruction of the field by bleeding, the opening into the nose is made by the anatomic knowledge and the sense of touch. If time is taken to maintain a clear field and to stop hemorrhage, the operation is lengthened beyond the desirable limit.

The operation is a modification of the Caldwell-Luc, but the use of the Hudson drill, thus speedily getting an opening into the anterior wall, the preservation of the inferior turbinate, and of the antral mucosa which is not curetted, and finally and chiefly in providing for constant irrigations after the Carrel method, transforms the operation from a radical procedure to the most conservative operation on the antrum. The mucous membrane of the antrum is conserved, the inferior turbinate is conserved, the strength of the patient is conserved. It is wrongly called an external operation, as nowhere in the skin scarred nor is there any deformity. It is an oral, not an external operation.

The after-treatment consists in washing through the antrum the night of the operation so that the nose may be clear and sleep possible. After the first day there is a through and through washing with some mild alkalin and antiseptic solution. Dakin's solution is too irritating. This can be done absolutely without pain through the projecting tube and is carried out every half hour while the patient is awake. A soft rubber ear syringe is used for these irrigations. A solution is placed near the patient and his cooperation enlisted. The morning of the fourth day the tube is removed and the hole remains sufficiently patulous for a few days to wash through with the small rubber ear syringe. At the end of a week or ten days this can no longer be done and the small metal tube of a De Vilbiss syringe is used to wash through the oral opening as long as possible. The antrum is now generally clear from pus. A nasal wash is given and the patient is discharged. There may be an acute exacerbation on taking cold, but it is easy to wash through the nasal opening and the infection subsides with practically no inconveniences.

Convalescence is very rapid and the cleansing of this reservoir of infection produces as marked a change for well being as follows the eradication of other chronic foci of infection.

The following is a typical case showing an obscure antrum condition acting as a focus of infection to a condition not generally attributed to removed infections:

Mr. C. C., age 20, presented himself for eye examination April 30, 1919. Right eye, vision 20/20; w. — .50 cyl. ax. 90° 20/10. Fundus normal. Muscular action normal.

Left eye vision, fingers at eight feet. Unimproved. Fundus normal. Third nerve partially paralyzed in all its branches. Slight ptosis, slight mydriasis. Eye diverges about 25 per cent, but has some motility inwards, upwards and downwards. Normal excursion outwards.

This condition has been present since patient was two years old, when without any discoverable cause the eye became paralyzed. This fall an operation for cosmetic effect on the paralytic squint was under consideration when the patient presented himself Sept. 9, 1919, with complete ptosis, marked mydriasis and complete lack of action of the other ocular muscles supplied by the third nerve. He stated he had a cold.

Nasal examination showed right nasal cavity normal; left nasal cavity showed small scab on anterior end of middle turbinate. There was a slight swelling of the anterior end of the middle turbinate with two small polypoid excrescences. The middle meatus was free on both sides of the middle turbinate.

Pharynx.—Both tonsils showed chronic infection. The left posttonsillar lymphatic pillar was swollen and very red. The X-ray showed all cavities clear except slight cloudiness of the left antrum, persistent in four different positions of exposure

The exacerbation of the eye condition seemed to the author dependent on an old latent antrum condition, the original acute infection of which was probably the cause of his original ocular palsy when two years old. The author's operation was performed on the left antrum followed by Carrel's irrigation. A specimen of the nasoantral wall procured by the punch forceps was sent to the University of Nebraska for examination. The report was, in part:

"In the submucosa there was marked connective tissue overgrowth, principally in the fibroblastic stage, with numerous lymphocytes. Diagnosis: Chronic inflammation."

The postoperative history was uneventful, except that the complete paralysis recovered to the condition it was when the patient was first seen and he returned to college one week after the operation.

The connection between the antrum disease and the paralysis seemed to be intimate, and I think we are justified in concluding that the original paralysis in childhood was dependent on an acute infection of the antrum which had remained the seat of a latent infection.

In conclusion:

1. The X-ray has exposed very many diseased antra which formerly were unsuspected. These low grade infections show only a faint but persistent shadow with the X-ray.

2. The author's method of dealing with these is constant irrigation according to the Carrel idea but with less irritating fluid to the nasal mucosa than Dakin's solution.

3. The means for this are provided by his operation, which also provides permanent drainage into the nose without destroying the inferior turbinate or the mucosa of the antrum and with a minimum of pain and shock to the patient.

400 Brandeis Theater Bldg.

X.

MILITARY SERVICE*

OF

CAPTAIN HARRY A. BARNES, M. C., U. S. A.

BOSTON.

I should be glad to give you a detailed report of my observations as an army doctor, were it not for the fact that I was assigned for service in the Surgeon General's office. My work, therefore, was entirely administrative. I do not wish to imply that for that reason it was uninteresting; indeed, I shall be surprised if the report which my Chief, Colonel Mosher, makes concerning the organization of the Otolaryngological Section of the Division of Head Surgery, does not prove the most interesting presented to the Society.

At the same time it makes a report from me unnecessary, and I am sending you simply the date of my service in the army.

Date of entering service, June 26, 1918.

Rank on entering, Captain.

First duty, Surgeon General's office, Washington, D. C.

Promotions, I was recommended for a Majority one week before the armistice, which put a quietus on all promotions.

Demobilized, November 26, 1918.

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*Symposium on Military Service of the members of the American Laryngological Association.

XI.

MILITARY SERVICE.*

OF

T. PASSMORE BERENS, M. D.,

NEW YORK.

Commissioned Major M. R. C., May 15, 1918.

Reported for duty U. S. A. General Hospital No. 1, Williams Bridge, New York, June 5, 1918; in charge of Section of Otolaryngology.

Discharged therefrom December 6, 1918.

Facilities: An empty ward was used as a clinic. Eventually partitions, washstands and sterilizers were secured; a room was set aside for mastoid dressings; another for local anesthesia operations; another for diagnoses and general treatment; one for a reception room; one for an office, and another for a storage room for dressings (the latter was also used for nurses). The various cases were segregated in their respective wards—there were wards for postoperative mastoids, wards for observation, tonsil wards (mostly postoperative) and a ward for mixed cases.

Equipment: Ample.

When I reported for duty, the patients in the wards were the general run of ear, nose and throat cases that one finds in a hospital for these specialties. Being a "General (Military) Hospital," the Medical Department had charge of acute cases, such as acute tonsillitis, etc. Those requiring surgical treatment were transferred to the Section of Otolaryngology, which was part of the Surgical Department. There were many cases of mild coryza, slight deafness, etc., among the staff, nurses and hospital attendants. Thees were treated in the clinic.

Influenza: During September and October, at the time of the epidemic of influenza, there were many cases of coryza, largely imaginative. Of some 1,300 cases of influenza in the medical wards, twenty developed acute otitis requiring myringotomy. The latter were performed early in the attack. They all made uneventful and rapid recoveries. The accessory sinuses were but seldom and then slightly involved. There was no tonsillar or laryngeal involvement. One case of fully developed mastoiditis (influenza infection) was brought and required immediate operation. He made an uneventful recovery.

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Tonsils: Two hundred and sixty-eight cases referred from the Medical Department had bilateral tonsillectomies performed, all under local anesthesia. A few of these cases had slight hemorrhages following operation, and a very few required stitching of the pillars with packing between. No desperate hemorrhage was encountered. This is the more remarkable because many of the operations were performed by men under instruction and without previous experience. Novocain was the local anesthetic. Healing took place in ten days or less.

The tonsils of two hundred consecutive cases were collected in sterile bottles and examined pathologically and bacteriologically.

(a) In one hundred cases of chronic tonsillar infection the following results were obtained by the laboratory:

"Ninety cases showed an indefinite streptococcus; 4 cases showed a streptococcus hemolyticus; 4 cases showed a spirillum characteristic of Vincent's angina; 2 cases showed definite diphtheria bacilli."

(b) In the group of focal infections there were 15 acute rheumatic cases, the tonsils of 8 of which showed indefinite streptococcus; 5 showed streptococcus hemolyticus; 2 staphylococcus and streptococcus; 1, colon bacillus in preponderance; 15 neurocardiac asthenias showed indefinite streptococcus; 18 goiter cases (15 of which showed indefinite streptococcus and 3 hemolyticus); 5 chronic cardiac (valvular) diseases (of which 4 showed indefinite streptococcus and 1 hemolyticus); 25 chronic arthritis (of which 20 showed indefinite streptococcus; 3 hemolyticus; 2 not noted). Microscopically the entire group of tonsils showed chronic involvement, some with small abscesses of various sizes, some with destroyed crypts, some contained areas of phagocytic invasion. (Report incomplete.)

Results: From what could be learned from the observations of the Medical Department, the only group of cases which showed an immediate benefit were the neurocardiac asthenia cases. Their nervousness disappeared, they gained in weight, and the majority of them were sent to full duty. The chronic goiter cases, valvular heart cases and chronic arthritis showed very little improvement during their stay in the hospital. Two cases of acute rheumatism developed acute pericarditis with effusion after tonsillectomy, and one case developed acute rheumatic fever with swelling in some of his joints within a period of ten days after the tonsils were removed.

Among the cases in the wards on my arrival, there were thirty of unhealed mastoid wounds—cases that had been incompletely operated upon (scratch operations) in different army hospitals around the port of embarkation. In practically all of these X-ray examination showed the presence of the zygomatic cells and of the tip cells. According to the history none had had myringotomy or paracentesis before operation. Eight recovered without operative treatment other than curettage under local anesthesia; the remainder required extensive reoperation. Three developed erysipelas, two on the side that had not been operated upon; one in the stitches of the wound. One had a temporary facial paralysis following a radical reoperation. As was to be expected, the results to hearing in all these cases were not good.

Instruction: Teaching clinics were held for the following: Tonsillectomies under local anesthesia; the various mastoid operations on the living; accessory sinus and mastoid operations using wet specimens; functional examinations of the ears: bronchoscopies, using the dog as the subject. Considerable interest was evidenced by the men who attended these clinics.

XII.

MILITARY SERVICE

OF

BRIGADIER GENERAL H. S. BIRKETT, C. B.,

MONTREAL.

Entered the Military Service of the Dominion of Canada in July, 1887, having been appointed Surgeon-Lieutenant to the Third Victoria Rifles of Canada.

In 1894, promoted to the rank of Surgeon-Major; in 1898 proceeded to the headquarters of the Royal Army Medical Corps, Aldershot, England, and there qualified with first class certificate.

Upon returning to Montreal, organized the first regimental Stretcher Section, each member of which was fully qualified.

In 1900, promoted to the rank of Lieutenant Colonel; organized and commanded No. 3 Bearer Company and No. 4 Field Hospital. In 1904, appointed principal Medical Officer of No. 4 Military District; and in 1907 went on to the Reserve in Medical Officers with the rank of Lieutenant Colonel.

At the outbreak of war in August, 1914, made application to be returned to the active list, and assumed the duties of Acting Assistant Director Medical Services, Military District No. 4, and in September of 1914 began the organization of No. 3 Canadian General Hospital (McGill). This unit was the first of its kind offered for overseas and consisted of a selected staff from the teaching body of the medical faculty of McGill University, with the Nursing Sisters from those hospitals associated with the clinical teaching of the medical faculty. This unit was accepted by the Dominion Government and the British War Office for Overseas Service, and I left in command of it with the rank of full Colonel, proceeding overseas on the 6th of May, 1915, and arrived in France June 12, 1915, and was appointed in 1916 consultant in

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otolaryngology to the Boulogne area. Continued as its commanding officer until the middle of November, 1917, when on account of illness was evacuated to England and invalided home in March of 1918. In September of 1918, upon the expressed wish of the military authorities overseas, was requested to return for duty, having recovered my health, and was promoted to the rank of Brigadier General and appointed Assistant Director General, Medical Service, of the Overseas Military Forces of Canada, and proceeded to take up these duties. Returned to Canada the middle of September, 1919, and demobilized on the 11th of November, 1919.

During this service abroad I was awarded the Colonial Auxiliary Forces Decoration in the field in 1916, and in January, 1917, was mentioned in dispatches by the Commander-in-Chief of the British Forces in France, Field Marshal Sir Douglas Haig, and was awarded the Companionship of the Most Noble Order of the Bath.

PERSONAL REMINISCENCES OF THE LATE LIEUTENANT-COLONEL JOHN M'CRAE WITH THE M'GILL HOSPITAL IN FRANCE, 1915-18.*

Lieut.-Col. John McCrae went to France with the First Canadian Division as Medical Officer of the First Brigade of Artillery in September, 1914, and wrote this beautiful little rondeau after the second battle of Ypres. Early in the organization of the McGill Hospital, Colonel McCrae was appointed Chief of the Medical Division of this unit and joined it in June, 1915, on its taking the field. One morning, early in November, he showed me, as his first critic, this poem, written in pencil on a torn piece of wrapping paper. It was subsequently published in "Punch," December 8, 1915. Whilst connected with this unit he also wrote his second war poem, "The Anxious Dead." There is no one for whom I had a higher regard and a greater affection than Colonel McCrae.

McCrae's fondness for dumb animals was one of his lovable characteristics. Before proceeding overseas he was presented by a colleague with a magnificent charger named "Bonfire," which accompanied him to France, and with his master went through the second battle of Ypres and the battles of Festubert and Givenchy, being wounded on two different occasions, from which he made a good recovery. Upon Colonel McCrae's taking over his new duties as Chief of the Medical Division of the McGill Hospital, Bonfire accompanied him and at once won the hearts of all. Bonfire, inured to the terrors of the battlefield and to the constant boom of the artillery fire, would stand motionless and unafraid at the level crossings and watch the express train pass within three feet of his nose; but one day, when Colonel McCrae had taken him down to the beach for a ride, this ordinarily patient animal began a series of sudden and vigorous jumps calculated to upset any steady rider. His master, on looking for the cause of his disturbance, after a careful search discovered it—a little sand flea, disporting itself up and down in front of poor Bonfire's slim legs.

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*At the recent dinner of the American Laryngological, Rhinological and Otological Society, held in Boston, on June 2nd, 1920, the Toastmaster, after reciting the poem, "In Flanders' Fields," asked General Birkett to say a few words about the author. These remarks are by request appended to General Birkett's military report.

At one time an order was issued requiring that all horses attached to hospitals be turned in to the depot, and of course Bonfire came under this category. To Colonel McCrae it seemed indeed hard to have to part with his beloved dumb companion, now in their happy days of comparative peace behind the firing line; and moved by the memory of those glorious days of hazard and endurance, he penned his plea that he might be permitted to keep his horse. Had Bonfire himself uttered the words, no eloquence could have given an appeal of more pathetic tenderness than that voiced by the Colonel in the cause of his gallant steed, with the result that General Headquarters gave Colonel McCrae permission to retain his horse.

With one of the convoys there came to the hospital a wounded soldier, and with him his little dog, also wounded, who was admitted with all the other patients, and a card was filled out for him bearing all the particulars, except his religion. Colonel McCrae was called in consultation, and under his kindly care the little creature thrived, trotting about the wards with two wounded stripes on his collar and never more happy than when with his healer and new master. "Windy" was with the hospital for many weeks, but when he seemed well on the way to recovery, a poison set in, and Colonel McCrae decided to free his faithful little charge from his suffering. By special permission of the Base Commandant, "Windy" was honorably laid to rest, as any other good soldier, as Colonel McCrae afterwards wrote, and over the spot in the hospital grounds a little cross bears the name of one more dumb creature who found in Colonel McCrae his truest friend.

Another member of Colonel McCrae's little family of dumb friends was "Bonneau," the house dog of the concierge. Every morning, at seven o'clock sharp, there was a patter across the floor of the Colonel's tent, a wet muzzle was thrust into his face, and the gentle lick of a warm, friendly tongue woke the sleeper, and told him that Bonneau had come to pay his morning call. Then for five minutes he would talk to Bonneau as he would to a friend, so solemnly and so kindly, and after their little talk Bonneau would trot away, quite happy for the remainder of the day. The French family to whom Bonneau belonged were offered by some friends as much as fifty dollars for the dog; but they, faithful to their affection for the friend of their family, refused to part with Bonneau, now more dear to them as a link with happy associations.

And so did Colonel McCrae endear himself to all, beloved by men and by the gods; for "being made perfect in a little while he fulfilled long years." He left us in the floodtide of his fame and fortune, a great physician, a gallant soldier, loyal to his King and Country, and a most sincere friend.

XIII.

MILITARY SERVICE*

OF

JOSEPH H. BRYAN, M. D.

Date of entering service, April 3, 1917.

Rank on entering service, Captain.

First duty as chief of the Eye, Ear, Nose and Throat Service, Walter Reed General Hospital, Takoma Park, D. C., June 11, 1918.

Promoted to Major, June 4, 1917; Lieutenant Colonel, February 1, 1919, Officers' Reserve Corps.

Demobilized December 2, 1918.

Reported for duty at the Walter Reed General Hospital, June 11, 1918, and was assigned chief of the Eye, Ear, Nose and Throat Service. At this time the service was in charge of Captain William H. Huntington, with Captain C. Norman Howard and Lieutenant S. A. Alexander as assistants. This service was in a very disorganized condition at this time, owing to the most inadequate facilities for caring for the patients. There was only one treatment table in a room about 25 by 30 feet, and a very small dark room for examining the eye cases, and the operating room was so small that it was with the greatest difficulty the operation could be properly done. At this time we were located in the administration building. Owing to the great influx of patients from the surrounding camps and the inadequate housing facilities, the building operations grew enormously, extending over a very large territory.

About the time of my reporting for duty plans had been drawn for the building of an operating pavilion which was to be divided equally between the Dental and the Eye, Ear, Nose and Throat services. General radical changes had to be made in these plans in order to meet the rapid growth of the service of which was chief. When completed this pavilion served our purpose very well. The organization of this department required a great deal of time and some tact on my part in order to bring about the changes most desired.

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Owing to the rapid growth and the daily increasing numbers of patients, at my request the Eye was separated from the Ear, Nose and Throat, and made an independent service with Major Haden in charge.

The service now consisted of seven medical officers, five nurses, and four separate wards assigned to the Ear, Nose and Throat. We averaged between eighty and ninety patients in the clinic daily, and the operations numbered occasionally as high as twelve. We carried out some interesting scientific investigations in conjunction with Lieut. Col. Nichols, chief of the laboratory service, viz., tonsils in relation to streptococcus carriers, and the sinuses and the ear in relation to the recent epidemic of influenza. The result of these investigations are now being made public.

My work was both administrative and professional; all of the major operations were done by myself, and we had a large number of interesting operations.

In all, my service in the army was most attractive and inspiring, and I regret I had only such a short time to serve actively.

XIV.

MILITARY SERVICE*

OF

MAJOR R. BISHOP CANFIELD, M. C., U. S. A.

ANN ARBOR.

Received commission, September 6, 1917.

Entered active service, October 20, 1917.

Ordered to Camp Custer, Michigan, to take charge of the Ear, Nose and Throat Service at Base Hospital. Remained at this post until May 5, 1918. During this period the Base Hospital was completed to a capacity of about 1,800 beds. The Ear, Nose and Throat Service occupied a building erected for that purpose in the center of the Base Hospital Grounds, and grew steadily to a service of about 30 to 40 beds, besides the consultation service carried on throughout the hospital. During the early months of this period the work was handicapped by lack of equipment, which was supplemented by members of the staff. Later an adequate equipment was secured. The service differed in no way from the average service in a civil hospital, as the epidemic experienced later did not appear until toward the end of my service. The policy laid down by the Commanding Officer of the Base Hospital was to the effect that, inasmuch as the men in this camp had been passed as fit for service, there was no need of attempting to build up a clinic, nor to take care of the minor conditions for which patients seek care in a civil hospital. This precluded the idea of doing any large amount of routine work, or of studying the question of prophylactic surgery of the nose and throat conditions from the standpoint of preventing the epidemics of measles, mumps, scarlet fever, and streptococcus infections which appeared later. During the latter part of my service these conditions began to make their appearance, and opportunity was given over a brief period for study of their relationship to acute infections of the nose and throat, to fatigue, and to exposure. It became clear to us that, without exception, these diseases were preceded by acute infection of the lymphoid tissue of the nose and throat, and that they were but rarely seen in men whose noses and throats presented no surgical conditions. Experiments carried on in the laboratory demonstrated that those men whose tonsils had been removed in civil life were but rarely carriers of the streptococcus, while those who had not been so operated and who became ill with streptococcus infection, invariably showed the same infection in the lymphoid tissue of the throat as in the blood stream. This brought up for discussion the value of a standardized nation-wide examination of the noses and throats of men eligible for military service. It is believed by us that such an examination and treatment by qualified specialists would have a marked effect in controlling such diseases, as proved of greatest importance in the camps in this country and overseas.

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*Symposium on Military Service of the members of the American Laryngological Association.

Aside from serving as chief of the Ear, Nose and Throat Service, I served as Registrar of the Base Hospital, President of the Special Examining Board until May 5, 1918, at which time I was ordered to its Neurosurgical School at New York City, remaining there until July 15. I was ordered to Rockefeller Institute for work on the Surgical Treatment of Wounds. July 29, 1918, I was ordered to report as Chief of the Surgical Service of Base Hospital 76, then mobilizing for overseas service. We received overseas orders August 31, 1918, and proceeded to Vichy, France. Here we took over 20 hotels in which we conducted a Base Hospital of about 2500 beds. We failed to receive our quota of nurses or our surgical equipment during my service with this hospital. This fact interfered considerably with our efficiency, although borrowed equipment made it possible to carry on a certain amount of surgical work, mostly of minor character. During this period we suffered severely from influenza, from which we lost five of our personnel, December 1, 1919.

On December 1, 1919, I was ordered to report to the Commanding Officer of Base Section 3, as Consultant in Otolaryngology. I sailed for home, December 29, 1918, and upon arriving at New York was ordered to Camp Dix for discharge, January 10, 1919.

XV.

MILITARY SERVICE.*

OF

GEORGE MORRISON COATES, Lieut. Col., M. C., U. S. A., PHILADELPHIA.

The writer entered the United States service on September 15th, 1917, as Major in the Medical Corps, U. S. Army, coming from the National Guard of Pennsylvania, and was immediately assigned to the Base Hospital at Camp Sevier, Greenville, S. C., arriving there September 18, 1917. His previous military service consisted in having served as Assistant Surgeon, United States Navy, during the War with Spain, and having been a medical officer of the National Guard of Pennsylvania for fifteen years. In May, 1917, he was on the retired list as Lieut.-Col., but returned to the active list at that time as Major.

On arrival, the hospital itself was found to be only partially constructed and not yet in condition to receive patients. The staff also was incomplete, only about fifteen having assembled so far under the command of Major T. E. Scott, M. C., regular army.

In passing through Washington, Colonel Mosher had outlined the plans of his department for the establishment of a Section of Head Surgery to be independent of the Section of Surgery, although this was later modified so that it became a Section of the Division of General Surgery. We found almost immediately that no adequate quarters had been provided for head surgery, one small room being designated as the Eye, Ear, Nose and Throat room and a small joining room to be used by the dental surgeons. As this was the best that could be obtained at the time, I proceeded to organize my department there, having by the 1st of October two assistants in the Ear, Nose and Throat Department and two in the Eye Department, besides two dentists. One of our initial experiences was convincing to the Commanding Officer and the Camp Surgeon, both regular army men, of the necessity for and value of specialists in army work. Apparently they had no conception of the type of work that was to be done in the base hospital and expressed the opinion a number of times that specialists were out of place in the army; that army surgeons should be qualified to do any and all kinds of work. Still further difficulty was experienced in getting the head section recognized as a separate entity presided over by a chief of service, but this was accomplished later after considerable effort.

Equipment was very scarce and hard to get and of poor quality when obtained. This difficulty was partially overcome by each member of the staff sending home for his own instruments. Practically no cooperation in this respect could be obtained from the C. O. Within a few hours after opening of the wards, the Section of Head Surgery began to function, being called into consultation for various medical and surgical cases, and for opinions for the Disability Board. Within two weeks it became evident that both the Eye, and the Ear, Nose and Throat Departments, could not work in one room. so the original room was turned over to the Eye Department and a small room in one of the wards fitted up as an Ear, Nose and Throat treatment room. The whole ward likewise was turned over to the head service and within a short time filled to overflowing.

The lack of supplies became more acute all the time as work increased and further expedients became necessary. Piano wire for tonsil snares was obtained from musical stores and Dr. E. W. Carpenter of Greenville kindly helped out the department when it ran short of some of the necessary equipment. Wooden tongue blades and applicators were manufactured wholesale by the patients, some of them becoming very expert. Applicators were also made from pieces of discarded wire and aural specula from rolls of tin. These are mentioned simply to show the dearth of supplies.

The assistants in the department were for the most part men of ability, conscientious and loyal. As the department increased and two wards became necessary a ward surgeon was assigned to each; one oto-laryngologist and one ophthalmologist were assigned to consultation work and spent the best part of the day seeing and treating cases in the wards, always by request sent through the medical chief. Cooperation between the different services was of a very high order and made one appreciate the great value of this type of group-medicine. In our own work, an expert consultation, medical or surgical, could be obtained at a moment's notice. The laboratory was always available for diagnosis, vaccine preparation, etc. The X-ray Department cordially gave us reports at any time and in any quantity.

Owing to the rather poor equipment in the general operating pavilion all the local anesthesia operations were done in the ear, nose and throat ward dressing room. Ether operations, however, were performed in the general operating room. As the weather became cold, and 1917-18 developed into a very cold winter even in South Carolina, heating facilities in the operating pavilion proved totally inadequate. As most of the mastoid cases were complicated by measles and bronchitis, being potential pneumonia cases, operation was frequently deferred as long as possible and even then was undertaken a number of times with the operating room heated only by a small wood-burning stove which smoked atrociously and scattered wood ashes all over the room when the wind blew down the chimney.

The characteristics of the service here were those usually found in a large civilian hospital. Practically every type of acute trouble was encountered although there were many more ear infections than infections of the sinuses. Early in November, an epidemic of measles occurred which included almost half of the personnel of the division. A great many acute ear complications were seen and treated. Prompt notice was brought to the department of any case suspected of incipient ear trouble and in nearly every case of acute otitis media the ear drum was freely incised at a very early stage. In spite of this, and thorough after treatment, a number of mastoids developed.

The soldiers of the 30th Division, which was served by this base hospital, were mountaineers from western North and South Carolina and eastern Tennessee. Contrary to the usual conception of mountaineers, they were for the most part very poor physical specimens, having had few of the diseases of childhood, having apparently little stamina or resistance, 30 per cent of them being hook-worm hosts and also very much below the average in intelligence and education. These conditions made them rather poor surgical risks, but the results of treatment were on the whole satisfactory.

During my six months' service at Camp Sevier, about seventy cases of mastoiditis were operated upon with two deaths. One of these was a case that came in from the field with meningitis well advanced and a dual cerebral abscess. The second one was a case of lateral sinus thrombosis who died after lingering for about three months. Three other cases of lateral sinus thrombosis were successfully operated upon. Healing in most of these mastoid cases was slow and with considerable deformity owing, I think, to the apparent impossibility at that time of obtaining the proper asepsis either in the operating room or the ward. The blood clot dressing was uniformly a failure and the standard packing of the wound had to be resorted to. The use of dichloramin-T towards the end of my service there, or bismuth paste, materially helped in shortening convalescence in these cases. Hearing was, as a rule good after convalescence. Two mild pneumonias developed possibly as a result of etherization, but both made quick recoveries. Many times during that winter all patients in the wards had to be kept in bed for several days at a time in order to keep them warm as woolen clothing was not issued until the winter was well advanced; and coal stoves did not appear until late in the season. Furthermore, during a period of acute congestion in the worst weather that was experienced it was necessary to place many hundreds of patients on the open porches simply screened off with canvas. This was undoubtedly very detrimental to our acute ear, nose and throat infections.

Many tonsillectomies were done, all under local anesthesia 1/10 of 1% cocain being used by injection. The method used was that described by Lewis of Philadelphia and consists in incising the tonsil, everting it and snaring it off. It is a quick comparatively bloodless and painless operation. No secondary hemorrhages were encountered and very little primary bleeding. A certain number of acute sinus cases were seen, but the number was very small and we used conservative treatment. Also of chronic sinus cases there were very few, a few ethmoidectomies and intranasal antrum operations sufficing to clear them up.

Myringotomies were, of course, very frequent, as many as twenty a day being done at times, mostly in the measles wards. Illumination could only be obtained by using a pocket flashlight, which was unsatisfactory at the best, or direct sunlight when possible. Local anesthesia to the drum (cocain, menthol, carbolic acid) was usually employed with more or less satisfactory results.

Peritonsillar abscesses were very frequent, sometimes four or five being incised in one morning. Following the measles epidemic, mumps appeared and later chicken pox, and there was at all times epidemic meningitis, pneumonia and a few cases of scarlet fever. Two of the latter were operated on for mastoiditis in the isolation wards.

Another activity of the Section of Head Surgery was the examining of candidates for aviation. Naturally the Eye, Ear, Nose and Throat Department had the bulk of this work to do though cordial cooperation was obtained from the rest of the staff. Of the first twenty examined most of the candidates were rejected for eye, ear or throat conditions or for failure in the equilibrium tests. Owing to the curious responses in the latter, a special investigation was made and it was discovered that most of these candidates came from the artillery regiments of the division, that they were ordered to take the examination against their will and were very averse to flying. In consequence they were trying to bluff us out, which accounted for any curious results obtained. Later on a better class appeared and the rejections came down to a normal figure.

Many examinations and reports were made for the "S. C. D. Board," most of them having to do with aural conditions. A great many chronic running ears were discovered which should not have been admitted into the service and these were always recommended for discharge as being unfit for combatant troops.

Quite a large number of malingerers were also discovered. These usually consisted in claims of unilateral deafness, at times the individual having normal hearing but more frequently having impaired hearing which was exaggerated into a total loss. Owing to the low mental average of these men it was usually a very easy matter to detect this malingering by simple methods such as shouting into the bad ear with the good ear only partially closed when total loss of hearing was claimed; also the usual trick of closing the good ear firmly and getting no response to ordinary questions but immediate response when asked to change position, turn around or get up. For the more astute cases the binaural stethoscope test or the tuning fork always sufficed. Great care was taken not to accuse of malingering anyone innocent and at least two observers examined the case and obtained similar results before a report was made.

During almost all of the six months the prevailing microorganism was the pneumococcus. This was found in the acute otitis medias, the mastoids, accessory sinuses, the tonsils, and the peritonsillar abscesses. It seemed to be almost universal. Towards the end, the streptococcus hemolyticus was appearing more frequently. During the fall and winter of 1917, we noticed a great many cases of pneumomoccic pharyngitis. These cases were all mild, complaining simply of a scratchy sore throat or hoarseness with occasional aphonia. The pharynx was very much congested and there were shallow ulcerations on the soft palate, pillars and the tonsils and also occasionally on the posterior pharyngeal wall. These ulcerations were covered with a semi-translucent, pearlish gray membrane which could be wiped off usually without much difficulty. They looked in some respects not unlike mucous patches and occasionally there was some difficulty in making a differential diagnosis. These cases all cleared up promptly, the period of disability being only a few days on the average. The aphonias, however, were more persistent, at times lasting for a couple of weeks or more. In these the neurotic element was plainly marked.

Capt. George F. Gracey was my Chief of Clinic and my mainstay, a most capable, energetic officer who later attained his majority most deservedly in the A. E. F. Capt. Eugene Orr was a clever operator and a fine otolaryngologist; Lieut. (later Captain) W. T. Bruner and Lieut. Burnside were Ward Surgeons, as well as Lieut. Weiss for a while. My gratitude is expressed to all of them for loyal service, and to all the members of the Eye Staff as well.

About the last of March, 1918, the writer was transferred to the Base Hospital at Camp Hancock, Augusta, Ga. He had held the title of Chief of the Section of Surgery of the Head at Camp Sevier Base Hospital and was nominally under the direction of the Chief of the Surgical Service, although in most respects the Section of Head Surgery had an independence existence. The same condition of affairs existed at Camp Hancock except that here the Head Section was entirely independent, although classified as a subsection of the general surgical service. Later on, indeed, as chief of this section, I was offered the position of Chief of the entire surgical service and only declined on account of my imminent departure for overseas.

On my arrival at Camp Hancock, I found that the Head Section had been through identically the same difficulties in organizing and equipping as we had at Camp Sevier and that my illustrious predecessor, Major John F. Culp, had used similar methods and expedients with excellent results. While the department was not in first-class shape, he also had suffered from the antagonism of the C. O. and had been unable to secure needed supplies and facilities. The otolaryngologists on the Staff there were excellent, consisting of Captain Edward W. Collins, one of my former assistants at the Pennsylvania Hospital, who was my Chief of Clinic, Lieut. (later Captain) John H. Doyle, of Fall River; Lieut. Eli K. Porch, of Philadelphia, and Lieut. M. Raskin, of Baltimore. All gave me loyal, faithful and effective service. Very shortly after my arrival, the head surgery building was completed and fully equipped under the able direction of Captain Collins and Lieut. Doyle and in every respect the work proceeded smoothly.

During the six months at Camp Sevier when we were doing many mastoid operations, Major Clup had only had one at Camp Hancock. This was probably due to the fact that the troops of the 28th Division were seasoned and in superb physical condition. In consequence there were no epidemics of measles or anything else and very little acute otolaryngologic work. Subsequent to my arrival, during the next three months and for the most part after the departure of the 28th Division a small number of mastoids developed needing operation, about twenty in all being done. Several of these were double and one was a case of lateral sinus thrombosis. But healing was rapid in every case without exception, in almost all of them a modified blood clot dressing being employed with the same technic that had absolutely failed at Camp Sevier. Curiously enough, also, the prevailing organism here was the streptococcus hemolyticus, while at Camp Sevier it had been the pneumomoccus.

Most of the surgical activities of the Clinic consisted in tonsil operating and corrections of deviated septums. The work was systematized so that four operators could easily work at once, the average time for tonsillectomy, after anesthesia was obtained, being about two minutes and for submucous resection varying from 5½ minutes to one-half hour. At Camp Sevier the anesthesia for tonsillectomies had been 1/10 of 1 per cent cocain for injection, nothing else being obtainable. At Camp Hancock for the most part apothesine 1 per cent solution was used with identical results as far as anesthesia was concerned. No toxic effects were ever noted from either of these drugs.

During a period of perhaps a month in the Spring 1918, every submucous case developed a severe pharyngitis or tonsillitis on the first or second day after operation, due probably to some infection in the ward. This was controlled by masking suspicious ward cases and by spraying the throats of the operated cases with 2 per cent dichloramin-T and when this technic was followed no further infection resulted. All operative work was done under strict antiseptic precautions. The patients before operation took a bath, shaved, put on clean pajamas and brushed their teeth. On arriving in the operating room, they were required to wash their hands and faces with soap, water and either alcohol or bichlorid solution. They were then put in sterile gowns with sterile caps on their heads and sterile sleeves pulled over the arms of the operating chair. If the case was a tonsillectomy, the site of injection was painted with iodine before the needle puncture was made. In a large number of tonsillectomies done, no infections or untoward results were observed. Most of the submucous resections were done on almost inconceivably battered-up noses, every type of deviation being present and all equally bad. Some tears necessarily resulted in these cases, but, owing to careful asepsis, after treatment and very light packing, no perforations resulted and good results were obtained in nearly all cases.

Dichloramin-T solution was found to be most satisfactory in any type of infection or abscess cavity where it could be applied directly to the suppurating area, small infections of the mastoid wound or partial decomposition of the blood clot in a few instances clearing up immediately after the dichloramin T-chlorcozane solution was employed. It was also used as a routine in the treatment of chronic suppurative ears awaiting the disability board and with results that we felt were better than by any other method of conservative treatment. The method of employment was to fill the external auditory canal full with the solution, a probe being then passed to the bottom to release air bubbles and pressure on the tragus employed to force the solution into all parts of the cavity. The ear was then plugged with cotton and allowed to remain this way for twenty-four hours, all odor disappearing and discharge being very materially diminished, although in the short time that these cases were under observation, none of them became entirely dry.

Another activity of the Head Section was the cure of chronic diphtheria carriers by tonsillectomy. There were probably about eight of these cases operated on, all of whom had shown continuous positive cultures for periods running from four to ten weeks and who had resisted every other means of eradicating the organism. Tonsillectomy was done on all these cases with the result that their cultures immediately became and remained negative. As at Sevier, hearty co-operation was always obtained from the rest of the Staff, and, after the first few weeks, from the C. O. also. Major (later Lieut. Col.) Fred Barrett, of New York, assumed command a few weeks after my arrival and was always most cordial in his support and most helpful in every way.

Late in July I was ordered to Camp Wadsworth, Spartansburg, S. C., to join Base Hospital 56, being organized for overseas service.

Shortly after my arrival I was directed to assume command and undertake the work of organization. Here again the same difficulties were experienced as in the organization of the departments in the two previously mentioned base hospitals, namely, lack of cooperation, chiefly in the supply departments. The work was pushed vigorously, however, and equipment obtained in one way or another so that the organization entrained for Camp Merritt on August 22nd with 188 men and 36 officers. At the very efficient embarkation camp which we reached in a few days, conditions were entirely reversed and everything was done to facilitate completing our equipment and preparation. The organization passed a splendid inspection two days after arrival and was ordered into the transport on the third day.

Base Hospital 56 sailed from Hoboken on the Transport Kroonland, in a convoy of nine other transports. She carried 3000 troops, 1500 of whom were Southern colored soldiers equipped as pioneer infantry who had been in the service but a few weeks, had no noncommissioned officers and were commanded by three First and three Second Lieutenants. It was my bad fortune to be placed in command of the two compartments containing these soldiers as well as our own organization. They were very bidable men, but knew nothing whatever of army or ship life and it was difficult to keep proper sanitation in these troop compartments where the ventilating fans were constantly breaking down and out of commission and where the plumbing leaked badly.

Influenza developed when about one week out of port, several hundred cases, all told, being reported, but no deaths occurred while at sea. The port of Brest, France, was reached on September 12th, debarkation took place September 13, and three days were spent in the so-called rest camp at Pontanazen Barracks.

Thereafter a three days' railway trip took us to the Hospital Centre at Allery in the Department of Saone et Loire. This Hospital Centre was in process of organization and was already occupied by three Red Cross Base Hospitals, ours being the first Army Base to arrive. It was constructed for ten organizations, although at no time did it ever have more than seven.

Base Hospital 56 took over an area in which work had been started by a sub unit of Base Hospital 49 (Univ. of Nebraska) and there were at the time of our arrival about 400 mild cases there. Our hospital was at once designated as the Contagious Hospital for the Centre and was also to have charge of all dermatological cases. Surgery was to be held at a minimum. Within a few hours after our arrival, one hundred nurses belonging to our unit appeared, 60 of these being immediately transferred to other organizations. Soon 20 nurses became sick from overwork so that during the most strenuous days of the hospital's existence, we had no more than 20 female nurses on active duty. We arrived with 180 enlisted men, which was 20 below our quota and 60 of these were at once detailed to other organizations. Within a few days another hospital section was put in our charge and staffed largely from our unit although small details of officers and men were added to it from time to time from other hospitals.

Hospital trains from the front kept pouring in with the sick and wounded from the Meuse-Argonne offensive so that our surgical wards were soon filled with serious cases, over 500 dressings being done daily and from 10 to 15 operations. The total capacity of the hospital section was designated to be 1000, but this was increased by orders from the centre C. O. to 1550 in 56 and to 1700 in 56A, giving a total combined capacity of 3250. This was only accomplished by crowding 70 to 75 beds in wards designed for 50 and that should not have had over 40. Every necessity for running a hospital was difficult or impossible to obtain. The roads were deep in mud and transportation was not available. Stoves did not go up until late in the fall, coal was very scarce, as also was food at times and drugs nearly always. Every available corner of the hospital had beds and patients in it, and the general mess had to work almost continuously to keep them fed.

During these trying times of endeavoring to organize in the face of these difficulties, we were further hampered by constant inspections and criticisms, not of vital things, but of unwashed window panes, cigarette butts around the ward back doors, muddy walks, etc. Such criticisms and occasional minor punishments, such as confinement to the area, made it difficult to keep the morale of the staff at its highest point.

In the contagious department, which was speedily reduced to one ward owing to the frequency with which the wounded came in from the front, the problem was how to efficiently isolate a dozen different kinds of contagious diseases. It was so successfully accomplished, however, that although the ward contained at one time epidemic meningitis, measles, scarlet fever, diphtheria, mumps and erysipelas, only one case of cross infection resulted during the three months the hospital functioned, and this was in a case of measles who had been definitely exposed to diphtheria before he arrived in our care. This result was accomplished by strictly cubicling every bed and masking every patient as well as the attendants, nurses and medical officers and by carefully sterilizing by boiling or burning every article that was carried into a cubicle. In addition each group of cases was divided from the others by moist sheets strung across the ward, and individuals passing from one group into another were required to change gowns each time as well as wash up in cresol solution. This required an enormous amount of work and attention to detail, but owing to the perseverance of Major Pilcher and his able assistants it was successfully accomplished.

An epidemic of diphtheria broke out in the center and was made worse by the difficulty in making a diagnosis between laryngeal diphtheria and membranous laryngitis in the gas cases. The symptoms were practically identical and in a number of instances gas laryngitis was diagnosed as diphtheria from the culture when at postmortem no evidence of membrane was found. In a number of cases also distinct diphtheritic membranes were found at postmortem where they had not been suspected, in gas and pneumonia patients. There were two or three deaths from laryngeal diphtheria in spite of tracheotomy being done, no intubation set being available, and the supply of diphtheria antitoxin having become very low and no more obtainable. Energetic measures were instituted throughout the entire center, with the active cooperation of the laboratory and the epidemic was soon under control.

Barron and Bigelow of the Center Laboratory in reporting on the situation believe that the influence of delayed diagnosis on the spread of diphtheria for the reasons mentioned above was quite large. This was controlled by an examination of the throats of all patients and personnel daily, together with the culture of all showing any suspicious signs. These cases were then isolated, until the result of the culture was known, in wards that were strictly cubicled and masked. Barron and Bigelow believe that the two probable modes of introduction of the diphtheria bacillus into the center were gassed carriers and chronic carriers. Factors in the spread of the disease were undoubtedly crowding (direct droplet infection), contaminated hands and fomites (indirect droplet infection), and delayed diagnosis was partly explained by the similarity of symptoms between laryngeal diphtheria and membranous laryngitis due to gas. Overcrowding was believed to be the most important. In addition to other methods of control, the Schick test was done, followed by immunization of all susceptible individuals when antitoxin could be procured.

Practically all deaths were autopsied. In the pneumonia cases it was my privilege to see a good many of the postmortems, and in each case the accessory sinuses and the middle ears were carefully investigated. In a very large proportion of cases, over 80 per cent if I remember correctly, pus was found in one or more accessory sinuses or in the middle ears, or in both. In nothing like this proportion was it found in other than pneumonia cases, which would seem to be significant.

Peritonsillar abscesses were quite frequent, and occasionally acute middle ears were seen, but even during the epidemic of influenza there were very few, and only two mastoids developed in our combined hospitals of over 3,000 beds in three months' time. Vincent's angina, either in the form of trench mouth or patches on the tonsils and pharynx, was quite common and yielded more or less readily to pure phenol, this being the only drug obtainable which would have any effect upon it. Most of our war injuries were in the body and extremities, those of the head being sent to other centers. We had a few perforating wounds, either from shrapnel fragments or machine gun bullets, of the nose, ethmoids and maxillary antra, and one case where fragments of shrapnel were lodged in the mastoid. These came to us as a rule with Carrell-Dakin tubes in position but usually very dirty. The Carrell treatment was continued in most cases, but where progress was not satisfactory a switch was made to dichloramin-T with the result that they cleared up nicely. No sequel other than an occasional aphonia or an epistaxis was noticed during the influenza epidemic.

Base Hospital 49 was designated for the care of head cases, just as ours was the "contagious" organization for the center, although 56 for the most part looked after its own head cases. Equipment in 56 for nose and throat work was very meager, consisting entirely of one canvas field roll, so that again I personally supplied all instruments, which I had brought with me. In Base Hospital 49, however, there was a fair equipment. No. 49 was a Red Cross organization which obtained its equipment by private subscriptions. This was augmented at Allery by drawing on the other Red Cross units for their surplus nose and throat material. Here good work was done with considerable operating on acute mastoids and sinuses.

After being assigned to several posts for short periods of time I became Surgeon in Charge of Otolaryngology at the Bordeaux embarkation camp, where there were two camp hospitals. During my three months' stay there the service was very light. Two daily clinics were run, one in each hospital, by my assistants, Captain Gregg and Captain Pearlman, but the cases were just the usual type of dispensary case.

The greatest asset I found in my work in the army was the very efficient and loyal personnel with whom I had the good fortune to work. This was true of all the departments of the Section of Head Surgery and also applies to the staff of Base Hospital 56, A. E. F. The chief difficulties that we had to contend with were the antagonism of the regular officers towards specialists of all kinds and the difficulty in getting supplies. At the time I left the United States, in August, 1918, that difficulty had been overcome at home, but it was encountered again immediately on landing in France and remained so until the end. It is probable that by this time most of the personnel of the regular army Medical Corps has been educated to a greater or less extent in the value of employing specialists even in the army. But it would seem important for this association to take some action looking towards the continuing of this viewpoint so that if another such emergency occurs the battle of the Section of Head Surgery will not have to be fought entirely over again.

XVI.

MILITARY SERVICE*

OF

MAJOR GERARD HUTCHISON COCKS, M. C., U. S. A.

Dr. Gerard Hutchison Cocks was called to active service in the United States Army on May 10, 1917, and served until January 16, 1919, over 20 months.

His time was spent, for the most part, at No. 1 General Hospital, Williamsbridge, New York, and in France with the Presbyterian Base Hospital Unit, which took over No. 1 General Hospital, British Expeditionary Force.

Dr. Cocks has written two articles on wartime subjects, one entitled, "Gas Poisoning in Warfare; A Study of the Effects of Mustard Gas Upon the Upper Respiratory Tract," and a second paper in conjunction with Captain Harold S. Neuhof on "Gunshot Wounds of the Mastoid."

Dr. Cocks was commissioned First Lieutenant in the Medical Corps, May, 1917. Captain, July, 1917. Major, September, 1918.

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*Symposium on Military Service of the members of the American Laryngological Association.

XVII.

MILITARY SERVICE*

OF

Major George Fetterolf, M. C., U. S. A.,

Philadelphia.

Commissioned Major, M. R. C., U. S. A., May 21, 1918. Chief of Department of Otolaryngology, Camp Sevier, Greenville, S. C., June 9, 1919, to July 27, 1918.

Chief of Department of Otolaryngology, Camp Hancock, Augusta, Ga., July 29, 1918, to February 12, 1919. Received discharge February 12, 1919.

The only notable feature of my service was the opportunity of observing and handling the otolaryngologic phases of the influenza epidemic at Camp Hancock. A report of this was sent to the Surgeon General and was read before the 1919 meeting of this association.

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*Symposium on Military Service of the members of the American Laryngological Association.

XVIII.

EXPERIENCES AND OBSERVATIONS IN THE SERVICE*

By Major Stanton A. Friedberg, M. C., U. S. A.

Chicago.

The experience of the writer was entirely confined to Base Hospital activities and was almost equally divided between service in the U. S. and the A. E. F. It was not limited to the practice of otolaryngology for "in addition to his other duties" on various occasions he engaged in medicine, surgery, epidemiology, laboratory and administrative work. On the unscientific side he qualified as a builder of mess huts and taking advantage of a slight acquaintance with plastic surgery and endoscopy, he was enabled to close perforations in lead-pipes, and do a little tube work in steam-fitting. The remaining portion of his time was occupied in a critical review of medico-military matters in general and sometimes in particular. Inasmuch as these observations were "not in line of duty" and as time has proved, were not necessary for the proper conduct of the war, they will be omitted from consideration and only those features relating to our specialty will be discussed.

Base Hospital conditions during the winter of 1917 and 1918 were no doubt more or less similar in the various cantonments. A million men may spring to arms over night. In the course of a week, however, the elasticity of the spring is apt to be considered impaired by the development of diseases incident to the grouping of large bodies of individuals. Base Hospitals do not spring into existence overnight under the most favorable circumstances, and the problem is still a little more complex when a camp is located off of the main line in a part of the country that God forgot.

The writer received his commission in the Medical Corps,

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November 6th, 1917, and was assigned to duty at Camp Doniphan, Ft. Sill, Okla., January 8, 1918. The Base Hospital was far from completion in spite of the fact that a division had been in camp since the previous autumn. Owing to the various epidemics the Hospital was greatly overcrowded. Equipment was lacking and patients in need of surgical aid were transported by ambulance to the Post Hospital, some little distance away. After operation, as soon as their condition permitted, they were returned to the base. Sanitary conveniences were inadequate. There was a paucity of nurses and the care of the patients devolved upon the corpsmen, many of whom had had but little training. In spite of all of these handicaps the amount and quality of the work done, was, to say the least, extraordinary. To have had even a small part in this accomplishment is a source of the greatest satisfaction and one of the most pleasant remembrances of the service to the writer.

In the department of Head Surgery, the problem of instrumental equipment was easily solved by sending for our own. Previous to its arrival it was found that a Goodell uterine dilator was a useful aid in resetting a fractured nose. Abdominal retractors properly held will allow ample exposure of the mastoid cortex. An overworked dull gouge is a matter of indifference to an anesthetized patient. By carefully directing the blows of the mallet the danger from concussion may be obviated. As a substitute for snare wire, hairpins proved their efficiency in something over 25 operations. A peculiarly negative result followed all our efforts to obtain wire. All these efforts were made through "channels," as the G. O. against unofficial communications was strictly observed and the distance to be covered was too great to allow of a personal interview.

Two wards were assigned to the department, one of which was partly occupied by the out-patient clinic rooms. With overcrowding about 60 beds could be placed. From 50 to 150 patients from the field visited the clinic daily. The calls for consultations in other wards were numerous and insistent. In one morning the writer examined 44 patients in other departments of the hospital. With the limited help and facilities the outside demands made it difficult to give proper attention to our own patients. The overcrowding of the out-patient department with men in different stages and varieties of disease was recognized to constitute a serious situation. Not a few patients visited the clinic, as it furnished them the opportunity of relief from drill for the day. Others came with minor ailments that could be cared for equally as well in quarters. By eliminating these classes we were able to establish the hospital work on a more satisfactory basis.

Climatic conditions were very trying as there was a wide variation in temperature and frequent dust storms. As a consequence there were many infections of the upper respiratory tract and middle ear. The policy was adopted of hospitalizing all acute middle ear cases, and it was demonstrated beyond question that this served to the greatest degree to prevent complications. Patients on other services who required special treatment were transferred when possible to our own wards. In this way a rather extensive hospital service was built up and the department had at one time 185 beds at its command.

A large portion of the work in the department was in otology. A considerable number of patients with mastoiditis requiring operation was found. From the middle of January up to May 1st, something over 80 mastoid operations were performed. At one period an average of 60 dressings were being done daily. The prevailing organism in our mastoid cases was the streptococcus hemolyticus. The prevalence of cross infections made it particularly necessary for close observation following operation. Patients would be making satisfactory progress and then suddenly develop temperature. In a day or so the additional diagnosis of scarlet fever, measles, mumps, diphtheria, malaria or erysipelas would be added to his clinical record. We also had the experience with two patients who apparently pursuing a normal course for several weeks after operation and then suddenly developed meningitis. Post mortem examinations failed to show any connection between the ear and the meningeal condition. Several cases of serous labyrinthitis were observed. As a complication in the acute stage of otitis, facial paralysis was found a number of times. The condition cleared up following operation. Cranial complications were rare. One patient developed severe symptoms after operation and on reoperation the diagnosis of extradural abscesses was confirmed.

Simulation of deafness was not uncommon. Not a few of these cases were in patients who had had a mastoid operation. The usual tests uncovered the deception. Several men with burns of the external auditory canal were seen. The condition was so unusual that it led to the supposition that they were made with deliberate intent.

In the diseases of the nose and throat, the usual variety of cases were seen. The acute accessory sinus infections were relatively fewer than would be expected under the circumstances. The most common throat conditions met with were tonsillitis, peritonsillar abscess, diphtheria and Vincent's angina. One patient with an edema of the larynx was observed. Hysterical aphonia was not at all uncommon. The condition that caused us much concern and consumed quite a good deal of our time, was the carrier problem A full report of our investigation has been published, and it is therefore unnecessary to go into any further detail. Over three hundred diphtheria carrier patients were operated upon, with, in the main, gratifying results. To show the extent of the infection, in approximately 20 per cent of the patients admitted to the Head Surgery Department, diphtheria bacilli were found to be present. One meningococcus carrier was cleared of the organisms by the removal of his adenoids.

In the early part of August, 1918, the writer was relieved from duty at the Base Hospital and assigned to Base Hospital 85 for overseas service. The organization left Ft. Sill, Sept. 1st, and arrived in France, September 23d. We were assigned to duty in the district of Paris and proceeded to organize the hospital. The class of patients assigned to us were chiefly convalescents from other hospitals. We did not receive battle casualties as we were not in a position to take care of them. Various members of the staff were assigned temporarily to other units and thus were fortunate in obtaining some experience in War Surgery. In the Head Surgery Department, the work consisted largely in the treatment of acute ear, nose and throat infections.

About the middle of December, 1918, the Hospital was discontinued and the unit sent to relieve Base Hospital 27 at

Angers, France. The Hospital at this place had a capacity of over 3000 beds. Postinfluenzal conditions and the acute infections furnished the larger part of the work. Climatic and billeting conditions were responsible for a great number of acute otitis media cases. Immediate hospitalization again brought about the desired results in preventing complications. The greatest number of patients in the department at any one time was about 175. About a dozen mastoid operations were performed. Practically all showed the hemolytic streptococcus. Acute infection of the frontal sinuses was very frequent. Involvement of the antrum was relatively uncommon. Vincent's angina was prevalent and in some instances ran a severe and protracted course. Wassermann tests were made in all cases and invariably negative in the absence of syphilis. Several cases of faucial and laryngeal diphtheria, which owing to delay in diagnosis, had reached a critical stage, were seen. Fortunately they all recovered. One foreign body case came under treatment. The patient gave a history of having had a piece of meat lodge in the esophagus twenty-four hours before. Under local anesthesia esophagoscopy was done and the mass of meat found impacted in a stricture of the esophagus. The foreign body was removed without special difficulty.

There was but very little operative work done as we were restricted to emergencies only. Here, too, during the spring months we had an influx of patients with trivial ailments and complaints. It was curious to see how rapidly symptoms could be transferred from one organ to another in patients who desired admission to the hospital. A veritable epidemic of hemoptysis developed in some of the wards, but singularly enough it was never possible to obtain a specimen of blood from a patient. Two patients with laryngeal tuberculosis were found and returned to the U. S.

A word or two may be permitted in comparing the organization of our special department in the U. S. and in the A. E. F. On this side the officer in charge had a number of assistants assigned to him. This was not the case in the units sent abroad. One officer, irrespective of rank, was assigned to special work. A condition of organization that allows a surgeon to have a number of assistants in one place and then relegates him to the position of a Ward Surgeon in another, is somewhat unsatisfactory and not conducive to the best results. The writer was relieved from duty with Base Hospital 85, April 12, and ordered to return to the U. S. He was discharged from service, April 29, 1919.

All in all a great deal of satisfaction was derived from his military service and he considers it a fortunate privilege that he had the opportunity to be of some assistance to the country in its time of need.

XIX.

DESCRIPTIVE AND STATISTICAL REPORT, DEPARTMENT OF HEAD SURGERY, BASE HOSPITAL, CAMP DODGE, IOWA.*

By Major M. A. Goldstein, M. C., U. S. A.,

St. Louis.

The Section of Surgery of the Head, as developed in Camp Dodge Base Hospital, includes in its comprehensive scope diseases of the eye; diseases of the ear, nose and throat; plastic surgery of the face; oral surgery, as applied to injuries and deformities by gunshot wounds and disease; brain surgery, requiring an investigation of all pyemic processes extending from the eye, the ear, the accessory sinuses; the surgery of the neck of infected areas, such as suppurating glands and cellulitis with original focal points in the tonsil and the ear; bronchoscopy, tracheoscopy and esophagoscopy.

This comprehensive section of surgery at Camp Dodge Base Hospital has been placed under the direction of one Chief of Service and a staff of qualified and experienced special surgeons, nurses with special training, graduate opticians and orderlies trained to such service.

The classification, Head Surgery, is arranged into the following subsections:

(a) Clinical Service.
(b) Hospital Service.
(c) Consultant Service.
(d) Special Examinations.
(e) Care of Officers and Nurses.

CLINICAL SERVICE.

The most recent improvements in the Clinical Service in Head Surgery has been the completion and equipment of Ward 41, first floor.

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This clinic has a capacity of active daily treatment of at least 200 ambulatory patients.

There are engaged in this clinic one Chief of Staff with the rank of Major M. C., who is the responsible and executive head of the Section of Head Surgery; one Ophthalmic Assistant Chief of Staff; one Otolaryngologic Assistant Chief of Staff, both with the rank of Captain M. C.; two ophthalmic clinic surgeons; four otolaryngologic clinic surgeons with the rank of Captain M. C.; two graduate opticians; one head operating room nurse, three specially qualified assistant nurses whose services are rendered in both the operating room and clinic service; one Sergeant, First Class, in charge of the paper work and business routine of the clinic; one Corporal, in charge of the enlisted men personnel; one stenographer, in charge of the section's correspondence and official bulletins and orders; one operating room orderly to care for sterilizing plant and surgical equipment; two orderlies detailed to attend surgeons at all operations; one orderly acting as register clerk; one nurse or qualified orderly in the branch dispensary; one orderly for clinic records and notations, and two orderlies for general cleaning and message service.

The Head Surgery Clinic is open from 8 a. m. to 5 p. m., daily (Sunday, from 9 a. m. to 12 m.), for the treatment of patients sent from the regiments and infirmaries, cases refered from other services or from the admitting office, and for the conduct of operations required in the course of such service.

Official reports of the Head Surgery Service to Washington are made monthly, as prescribed by General Orders No. ——, through the Department of General Surgery, and include a detailed statement of all patients treated; of all operations performed; their character, result, technic, name of operator and anesthesia; with the time of performance: name, rank and organization of patient, operator, etc.

When first organized the Base Hospital of Camp Dodge occupied as quarters the barracks now used by the 313th Sanitary Train.

The Section of Head Surgery was housed in one room, used the equipment of a fixed hospital and had a few beds scattered at random in the medical and surgical wards. The work was done by one Captain M. R. C., and ten Lieutenants M. R. C.; no members of the Army Nurse Corps were then on duty, and work was limited to operations and treatments absolutely necessary; no major operations and only a few elective operations (such as tonsillectomies) were attempted.

The new Base Hospital was occupied about October 25, 1917, and the Section of Head Surgery moved into its new quarters at that time. It now occupies a building devoted to head surgery, a good sized lecture room, an eye operating room, reflection and dark rooms; an ear, nose and throat clinic room, and nose and throat operating room and sterilizing and linen rooms, these, with the office of the Chief and Assistant Chief of Service, comprised the quarters occupied. The house was located at first in one, and then two, and lastly three wards.

RECORDS.

A specially arranged card index record is kept of every patient admitted to the clinic service of head surgery. This record contains a brief statement of diagnosis, treatments given, progress, and final disposition of case.

HOSPITAL SERVICE.

The Hospital Service comprised in its maximum capacity three two-story barracks, comprising wards 39-41 and 43, was constituted as follows:

Hospital Barracks No. 39 is composed of four wards, each of a capacity of sixteen beds and three isolation wards; wards A and B used for clean surgery (tonsillectomies, septum resections, plastic surgery, etc.). Wards C and D (total capacity of 32 beds), for postoperative mastoids, acute accessory sinuses and acute ear cases; the isolation rooms (of three beds' capacity) were used for observation and isolation of infections developed during the postoperative care of these cases.

Ward 41, the entire first floor of Hospital Barracks 41, used as the head surgery clinic. Wards A and B on the second floor (capacity, 32 beds), used for eye cases. An unusual feature and adding much to the efficiency of the work in head surgery was the establishment and the equipment of a branch bacteriologic laboratory department. This branch laboratory is located on the second floor of Hospital Barracks No. 41, especially convenient to the making of all cultures in the clinic and the group of barracks assigned to head surgery.

Ward 43 (capacity, 64 beds and three isolation rooms), given over to acute throat infections (pharyngitis, tonsillitis, Vincent's angina and operative pus cases).

To each hospital barracks is assigned a ward surgeon of the head surgery staff. The supervision of Head Surgery Hospital Service and all the work of the ward surgeons is directly in the care of Assistant Chief of Service.

CONSULTANT SERVICE.

The Consultant Service of the Section of Head Surgery consists of the supervision of all cases in the Base Hospital grouped under the department. An attempt has been made to systematize the work of the service and to economize in time and distance. A regular appointed Staff Surgeon is assigned to do this consultant work, and each ward and barracks of the Base Hospital is visited daily.

In the office of each ward is a peg for head surgery and each ward surgeon and supervising nurse is instructed to leave memoranda on the peg of all patients requiring the attention of the consultant in the ward. This plan insures head surgery attention to every bed patient in the Base Hospital who is unable, because of contagion, isolation or other and more serious ailments, to be assigned directly to the Department of Head Surgery.

SPECIAL EXAMINATIONS.

Special examinations may be classified: Aviation examinations, eye, ear, nose and throat work of the Recruiting Office and demobilization work.

The aviation work was done with full equipment and under the auspices of the Chief and Assistant Chief of the department.

The Recruiting Office Eye, Ear, Nose and Throat Service has been carried out by members of this staff whenever required at the Recruiting Office. The examination of the eyes and ears of all students for the Nursing Corps are made by this department.

In the work of demobilization a number of the staff surgeons of head surgery have been assigned to an examination and tests of sight and hearing.

CARE OF OFFICERS AND NURSES.

To the Chief and Assistant Chief of this department is assigned the responsibility and the service of caring for officers and nurses in the hospital and in the clinic whenever attention is required for professional work in this field.

XX.

REPORT ON SERVICE IN THE ARMY.*

By Captain D. Crosby Greene, M. C., U. S. A.,

Boston.

I was commissioned as Captain in the Medical Reserve Corps, U. S. A., on April 8, 1918, and received telegraphic orders assigning me to Camp Sevier, S. C., on May 13th following. On May 18th I reported to the Commanding General of the camp and was assigned to duty with the Provisional Casual Battalion. At this time the 30th Division, which had occupied the camp during the winter and spring, having completed its organization and preliminary training, was in the act of moving to the port of embarkation, and the 81st Division, which was to complete its organization there, was already beginning to arrive as the last of the 30th were leaving.

My first active duty was on the examining board which was assembled for the physical examination of the recruits recently drafted, who came in to fill up the personnel of the 81st Division.

I served on this board for three weeks. The unit to which I was assigned examined between three and four hundred men daily, and I made the otolaryngologic part of the examination.

The outstanding features of this work were the small proportion of those unfit for service as compared with the larger number who attempted to evade it by malingering. It may be assumed that the local boards had already rejected most of the drafted men who were unfit, but many who had been passed by them claimed deafness. It was noticeable that there were waves of malingerers. There would be a group of them in one company, who had evidently discussed the matter among themselves. As a rule, the detection of these cases was simple, but took a good deal of time in the aggregate.

With very few exceptions, the men rejected had chronic otitis media purulenta with perforations and discharge.

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A considerable number of men were referred to the Base Hospital for tonsillectomy and septum resection.

I was impressed by the fact that with better organization and coordination the same grade of examination could have been given in much less time. There was a great waste of time on the administrative end, which could have been avoided by better arrangement of details. At a time when the supreme object of everyone was to build up the army as soon as possible this seemed to me a defect open to serious criticism.

It appeared to me that it would have been better to keep together units of examiners for this special work, for longer periods of time. In spite of the fact that this duty appealed less to the average medical officer than any other work of the department, it was none the less most essential and deserved the most efficient handling. Taking the unit to which I belonged as an example, it was obvious to all of us that at the end of three weeks we were capable of passing upon a much larger number of men in a given time than we were in the beginning, and that without lowering the standard of our examination.

After three weeks on the examining board I was transferred to the Base Hospital for duty in the Otolaryngologic Department and remained there during the rest of my period of service in the army. During the first six weeks it was my great pleasure to have as immediate superior and chief of the department Major George Fetterolf of Philadelphia. I look back on my association with him as the pleasantest and most profitable part of my army experience.

I was assigned to the duty of Ward Surgeon in charge of one of the two wards given up to the Head Section, and had thus the opportunity of learning through actual experience the routine of paper work in a Base Hospital.

On July 28th Major Fetterolf was transferred to Camp Hancock, and I succeeded him in charge of our department, a position which I held until my discharge from the army on December 20, 1918.

The Otolaryngologic Department of the Base Hospital at Camp Sevier began its existence on September 27, 1917, with the arrival of Major G. F. Coates, who remained in charge until March 17, 1918. He guided the department through its difficult beginnings, and at the time of my advent affairs were running smoothly, and the ear, nose and throat clinic was comfortably established in the Head Section. A building with two wards of forty-six beds each was assigned to its use. The capacity of the hospital at this time was about 1,600 beds.

A brief description of our routine may be of interest. The clinic hours were from 8 a. m. to 12 m., and from 1 p. m. until 4 p. m., on all days excepting Sundays and holidays, when the hours were from 9 a. m. until 12 m. During these periods members of the staff were on duty at the clinic examining, treating and operating.

Outpatients from the camp usually began to come in at an early hour. The chief of the service ordinarily made a visit to his wards at the beginning of the day, seeing with the Ward Surgeon those cases who were confined to their beds. Ambulatory ward patients for the most part came to the clinic room for treatment. Throughout the day calls for consultations on patients in the other services came in, and one of the staff was detailed to respond to those calls. It sometimes happened, as during the measles epidemic of late 1917 and early 1918, and the influenza epidemic of September and October, 1918, that there were patients with ear, nose or throat complications in most of the wards, and one officer spent the better part of the day going through them all, seeing and treating the patients. In this way we were in daily touch with these patients all over the hospital. When there were more than two officers on duty at the clinic it was found useful to detail one, even in normal times, to make the round of all the wards, inquiring of each ward surgeon whether he had any cases which needed attention from our department, attending to such cases, and later making a report to the chief of the department. The following classification may be made of the routine work of the clinic:

1. Examination and treatment of patients.
2. Hearing tests and examinations of officers and nurses newly arrived at this post, of those assigned to overseas units, and of officer candidates for promotion.
3. Tests of candidates for the aviation corps for operations.

Occasionally individuals of our personnel were detailed to duty in the field as members of examining boards.

The variety of cases seen at the clinic was quite large and not unlike that of a civilian clinic of similar size. To one accustomed to the latter there was a noticeable absence of certain classes of cases such as patients with tuberculosis or malignant disease of the upper air tract. On the other hand, certain cases rarely seen in civilian clinics were not uncommon in ours, namely, cases of malingering, hysterical deafness and hysterical aphonia in men. In spite of the effort of the authorities to keep out of the army men with chronic suppurative otitis media with discharge, a large number of these cases appeared in our clinic.

A few cases of pronounced hysterical aphonia and hysterical deafness were seen. Two of the former came under my care and were cured by reeducation and suggestion. They were extremely obstinate cases and were most difficult to handle.

Two cases of hysterical deafness showed complete loss of hearing. Attempts to waken them when asleep by loud noises failed. In one case the patient was put under primary ether anesthesia. The only result of this was the production of a prolonged state of excitement lasting several hours, which required the attendance of several orderlies to restrain the frantic struggles of the patient. The next day he heard no better, but the following night normal hearing returned. This patient had made no response to any tests of hearing. Turning tests were tried but were unsatisfactory on account of the fact that he was in such a state of trembling fright that it was impossible to judge of the nystagmus.

The other patient was cured by our psychiatrist by suggestion. Both of these cases were negroes.

The bulk of our work was concerned with cases of acute inflammatory diseases of the ears and upper respiratory tract. In the operative side of the work tonsillectomy was, as usual, the most frequent operation. In nearly all cases this was done under local anesthesia by infiltration with one-half per cent novocain solution, and the prevailing method of operation was that of preliminary dissection followed by the use of the snare.

In connection with tonsil operating under local anesthesia, I should like to record the occurrence of abscesses of the lateral pharyngeal wall following operation in three cases at our clinic. In one case this resulted fatally, though not under my personal observation; the only case which I saw made a good recovery after thorough incision and drainage.

The danger of postoperative complications of this nature is one which cannot altogether be avoided when deep injections are made at the periphery of the tonsil and constitutes an objection to this method of anesthesia. There were no immediate deaths from the anesthetic solution at our hospital, but the report of fatal results in a few cases from other camps reached us. These in addition to one personal experience of my own in practice, four years ago, of a death within five minutes of the injection of 1½ drams of a solution of ¾ per cent novocain, have impressed the fact that infiltration anesthesia in this region is not without risk.

STATISTICS, OCTOBER 11, 1917, TO DECEMBER 1, 1918.

The total number of cases seen at the clinic was	7,498
The total number of patients admitted to our wards	1,966
The total number of operations performed	1,347
The total number of tonsillectomies	523
The total number of resections of the septum	93
The total number of intranasal operations on sinuses	77
The total number of mastoidectomies	83

Other operations included:

Radical frontal sinus operation	1
Resection of jugular vein for sinus thrombosis	3
Removal of tumor of upper jaw	1

There were two cases of death following operation: one the case of abscess of the pharynx already referred to, and one following radical frontal sinus operation.

GENERAL SURVEY.

During the late fall and early winter of 1917 an epidemic of measles brought in its train a large number of cases of acute purulent otitis media with consequent mastoiditis. The infecting organism was in the large majority of cases the pneumococcus. The conditions created by the epidemic were aggravated by the severe weather of that winter, and the otolaryngologic staff were kept busy, the daily clinic attendance numbering as high as 150 some days. With the advent of spring the work perceptibly diminished, and during the summer became very light and continued so until the influenza epidemic in September and October. During this epidemic our staff was depleted to help make up for the deficiency in ward surgeons, but there were relatively few cases of serious complications involving the ear, nose and throat.

The outstanding rhinologic complication was epistaxis, which was an early symptom.

Sinusitis was infrequently met with clinically, but was shown at autopsy to be present in over one-half the fatal cases in which the head was opened.

Otitis media was an infrequent complication, occurring in less than 1 per cent of the cases. Rapid recovery was the rule and only five cases came to mastoid operation.

Laryngitis of a severe and persistent type occurred in eighteen cases.

With the subsidence of the epidemic the work dropped off, and up to December 1st the clinic attendance was slight.

The amount of tonsil and septum operating was governed chiefly by the advent of new troops to the camp. With the arrival of each group of recruits there was always an increase in the number of tonsillectomies and submucous resections. During the epidemic of influenza all operating except that of an urgent nature was suspended, and shortly after the subsidence of the epidemic and the signing of the armistice operations were likewise discontinued by orders from the Surgeon General's office.

The department profited at all times by the opportunity for free consultation with other departments. Of special value was the advice of the Chief of the Laboratory Section. His suggestions in regard to the laboratory tests to be employed, especially in patients who were critically ill, were of great assistance and emphasized the importance of calling him in consultation in such cases. The field of a clinical pathologist is one which might be further developed to the advantage of hospitals, in which the tendency to crowd the laboratory with unnecessary tests often occurs at the same time that essential tests are overlooked.

In our own department we found that the plan of having one officer detailed to make a round of all the wards, scouting, so to speak, for cases, was productive of good results. This was, however, possible only when there were enough officers on the staff to provide at least two for duty at the clinic. The plan is suggested as one element in any comprehensive scheme to secure cooperation of all departments, which means effectiveness of the hospital as a whole.

XXI.

MILITARY SERVICE*

OF

SENIOR LIEUTENANT JOSEPH B. GREENE, M. S., U. S. A.,

ASHEVILLE.

I was first ordered to recruiting duty in the Navy on April 25, 1915, with the rank of Junior Lieutenant, and continued on this duty until April 10, 1918. Then I reported at the Norfolk Naval Hospital and was placed in charge of the nose, throat and ear work with two assistants. The hospital at Norfolk was the largest one in the naval service.

On March 28, 1918, I was promoted to the grade of Senior Lieutenant (corresponding to the grade of Captain in the Army). On April 1, 1919, I was ordered to the Transport Finland, and sailed for France on April 10, 1919, returning to America on May 1st. I was then ordered to Norfolk, where I remained until I was discharged from the service on January 23, 1919.

The service at the hospital in Norfolk was large and interesting. The regular naval officers afforded me every facility and co-operated with me heartily in the work.

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*Symposium on Military Service of the members of the American Laryngological Association.

XXII.

MILITARY SERVICE*

OF

MAJOR THOMAS H. HALSTEAD, A. R. C.,

SYRACUSE, NEW YORK.

On the organization of the Air Medical Service of the Army, I was made Chief Medical Examiner of the service at Syracuse, N. Y., and continued as such until the service was discontinued. Later served as a member of a local consulting medical draft board until leaving for France in June, 1918.

In June I enlisted in the American Red Cross, arriving in Paris July 11, 1918, where I was made Chief of the Medical Intelligence Bureau of the Medical Research and Intelligence Department of the American Red Cross, of which department Major Alexander Lambert was the head. Headquarters were in Paris. Rank of Major, A. R. C.

This department consisted of four bureaus: Medical Research, Medical War Publications, Library and Medical Intelligence. The department organized and financed the investigation of many medical war problems, notably trench fever, under the leadership and actual work of Col. Strong, M. R. C., and his army associates, published a high class monthly medical journal, known as the *Medical Bulletin* and later as *War Medicine,* devoted entirely to war medicine and surgery, distributing it throughout the whole medical personnel of the A. E. F., as many as 15,000 copies a month. It published and distributed to the same source many timely treatises and pamphlets on surgical subjects of immediate importance. It organized and held in Paris regular monthly medical meetings for the Medical Corps, under the management of the Research Committee, at which meetings the most important members of our army as well as of British and French representatives were present for the discussion of practical problems.

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*Symposium on Military Service of the members of the American Laryngological Association.

The department maintained in Paris a first class medical library, both reference and circulating, for the use of the A. E. F. The Medical Intelligence Bureau, of which I was chief, was the fourth branch of the main department. This bureau undertook to investigate and make a research of the literature on any question or subject desired by any member of the Medical Corps, furnishing abstracts or original articles when desired. For this purpose a staff of librarians, translaters, abstracters and stenographers was organized, subscriptions made to all the important medical journals of the allied countries, access gained and cooperation secured with the rich medical libraries of Paris, and an immensely valuable index of war medical and surgical subjects was built up and was being made use of to a most gratifying extent when the armistice called a halt to the progress of this, as well as to the other bureaus of the department. Six weeks before the armistice was signed I was made Field Director of the whole department, my new duties taking me in an executive capacity to the Evacuation and Mobile hospitals at the front and to the Camp hospitals in the rear, as well as to the various headquarters of the different activities of the Medical Department of the Army, the Surgeon General's office, the laboratories, sanitary schools, etc. A number of automobile and trips by rail were required in this work and afforded an excellent opportunity to see much of the magnificent work of our militarized profession in France. My headquarters were in Paris, and a part of my duties was to render what surgical service I could to the French in whatever military hospital my service might be welcome. The result was that all my available time, mostly mornings, after the bureau was organized and while I was not away from Paris, was spent in two large surgical departments of Val du Grace Hospital, the largest and oldest purely military hospital in Paris. I was so fortunate as to be accepted as an assistant by our associate honorary fellow, Dr. H. Luc, in the otolaryngologic department of this hospital, and had the great pleasure and profit of assisting our distinguished confrere in many of his operations. His operations on the mastoid, both simple and radical, and which were numerous, were all under local anesthesia, novocain. His patients were all military. Dr. Luc is giving, and throughout the war, has given arduous and valuable service to his country.

Much more of my time was spent in this hospital in one of the Departments of General Surgery, where I assisted in the service of Dr. Sencert. Dr. Sencert exemplifies the highest type of French surgeon. I have never seen his superior and rarely his equal as a surgeon He will become famous in medical history because of the original work of himself and Prof. Nageotti, professor of physiology in the University of Paris, on the transplantation of animal sterile dead connective tissue to the living human. It was my great good fortune to see a number of these experimental operations on the dog and to witness several (assisting in one) operations on French soldiers in which dead tendon or nerve, removed from the dog or calf four to six weeks earlier and since preserved in alcohol, was transplanted to the useless, tendonless arm or to the excised sciatic nerve of the wounded soldier (weeks after the injury), the new and foreign transplant restoring function to the useless limb or limbs In the dog I saw a number of similarly excised and transplanted carotid arteries, the experiment brought to a successful termination as shown weeks later. This work will prove to be epoch making and will open to surgery in all branches undreamt of possibilities.

Though never assisting, it was my good fortune to witness on many occasions the marvelous faciomaxillary plastic surgery of that master of this difficult work, Dr. Morestin, who was at the head of this department in Val du Grace.

Dr. Morestin was a surgical genius, a prodigious worker, a master of technic, a born artist and withal the most skillful operator I have ever seen. He was the head of similar departments in three of the largest military hospitals in Paris, having 365 beds in Val du Grace, and about a thousand in all three. Each patient usually required a series of operations. He personally, with but little though highly skilled assistance, did these operations and watched the after-care. When I saw him he gave the appearance of being utterly careworn, completely tired and exhausted, as he doubtless was, so that I was not surprised to read a few months later of his death at the age of 48.

I returned to America January 1, 1919.

XXIII.

AN ACCOUNT OF THE ORGANIZATION AND DEVELOPMENT OF THE SCHOOL OF OTOLARYNGOLOGY.*

CAMP GREENLEAF, CHICKAMAUGA PARK, GA.

BY LIEUT. COL. THOMAS J. HARRIS, M.R.C., U.S.A., Director,

NEW YORK.

Introduction.—Camp Greenleaf was a part of the comprehensive scheme of postgraduate instruction for medical officers, which owed its conception to the far seeing mind of General Edward L. Munson, M. C. The need of such training to render the medical men competent to do properly the work in the army which was to be required of him, had already, before America entered the conflict, impressed itself upon him.

The full story of how it was put into execution at Fort Reilly by Colonel William Bispham, M. C., at Fort William Harrison by Colonel Ashburn, M. C., and at Camp Greenleaf by Colonel W. H. Page, M. C., and what has been accomplished by them and their successors and the officers will be reported in full at the proper time. It is sufficient at this time to say that it proved to be one of the most important of the many scientific accomplishments, so far as medicine is concerned, brought about by the great war.

Organization.—The School of Otolaryngology, Camp Greenleaf, was organized May 12, 1918, and the first class began its work on the 18th of the same month. On the first of these two dates Lieutenant Colonel, then Major, Thomas J. Harris, M. C., reported under orders from the War Department as instructor in otolaryngology. A considerable number of student officers was waiting instruction and a class of sixteen was detailed for that purpose.

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*Symposium on Military Service of the members of the American Laryngological Association.

Building.—A room in Ward Q of the General Hospital was set aside as the lecture room and equipment sufficient to permit of beginning work the following week was gathered together. The school was operated in connection with the Ear, Nose and Throat Department of the U. S. A. General Hospital No. 14, which soon outgrew the quarters assigned to it. This led to the removal of the wards and the school, in July of this year, to McDonald Field, where two buildings and a half of a third building were assigned for its use.

The lower floor of one of these (Ward No. 29) was set aside for clinical and teaching purposes. It contained two treatment rooms, thirty-one by ten feet, with concrete floors, electric lights, etc., a well lighted operating room, twenty-four by twenty-one feet, with concrete floor; a sterilizing room; a private treatment room for officers; a dispensary room; an office for the director; and a lecture room, forty-eight by twenty-four feet in size. All of these were conveniently connected one with the other.

The three wards together contained 128 beds, most of which were constantly occupied.

Equipment.—At the beginning the equipment of the department was exceedingly meager; one nasal speculum and a tongue depressor virtually represented all that the staff had to work with.

A requisition for a complete list of instruments and equipment was early sent in, and in due time everything that was needed in an up-to-date ear, nose and throat clinic, both for treatment and for teaching, was provided. The grateful thanks of the department are due to all the various purchasing officers of the Surgeon General's office. Without such equipment it would have been impossible to do the work that was accomplished.

The operating room was fitted up with two operating tables and a "Holmes operating chair," an Ohio Chemical and Mfg. Co. "gas and oxygen" outfit, an instrument cabinet, dressing cases, etc.

The sterilizing room was provided with an electric American Sterilizing Co. apparatus, capable of sterilizing all dressings and instruments for the department. Each treatment room contained four places for examination and treatment of patients, with a wash bowl at each place serving as a cuspidor, and electric connections for lights. At the end of each room there was a place for the assistant in charge of the clinic to work. Each room was provided with a modern "Wappler" suction apparatus. The private treatment room was also well equipped and contained a "Wappler" suction outfit. The lecture room was provided with blackboards and a "Barany turning chair."

The school was particularly fortunate in possessing an unusually valuable collection of out sections of the head, loaned by Lieut. Col. Harris P. Mosher, M. C., and Lieut. Col. William H. Haskin, M. C. In addition to these there was a good supply of wet specimens of the head, a gift of Lieut. Col. C. W. Richardson, M. C.; a fine collection of lantern slides of the accessory sinuses, a gift of Major H. W. Loeb, M. C., of St. Louis, and a collection of excellent slides of the ear, a gift of Dr. B. Alexander Randall of Philadelphia. Without these collections, satisfactory teaching would have been impossible.

Clinical Material.—The clinical material was at all times abundant. At no time were there less than 1,200 patients, and often as many as 2,000 or 2,500, in the hospital. In addition to this, the various camps scattered throughout the park contained as many as 60,000 troops at times and served as feeders.

The Student Officers.—Altogether, 110 student officers have passed through the school. These were selected after careful examination by the director or his representative, and represented only a portion of those who desired to take the course. On account of the limited time it was impossible to admit beginners, only those showing real fitness being received, and these were not allowed to continue the course in case they proved, after a short time, to be incompetent.

Outline of the Courses.—The course was planned to run from four to six weeks, but from the fact that the War Department did not order the men away at the end of that time it extended in many cases to eight and ten weeks. It was the endeavor to make the course as thorough as it could be made in the time allotted for it. It consisted of lectures and practical work, observation of operations, ward walks, and the performance of operation by the pupil himself as he showed his ability.

The lectures were given by the director of the department, by his assistants and by the heads of the other departments, including that of the School of Laboratories, School of X-ray, School of Ophthalmology, etc. Much attention was given to anatomy, which was taught with wet and dry specimens, lantern slides and upon the cadaver. For practical work, the class was divided into small groups in charge of assistant instructors. Each student officer was provided with a head mirror and examining instruments and required to make examinations and diagnoses himself. Each week the subjects treated during the week were gone over in quiz by the director of the school. At the end of the course a written examination was given, as well as a practical examination. Based on these two examinations the officer was rated. A report of the ratings was sent each month to the Surgeon General. Officers who had graduated satisfactorily from the school were assigned as assistants in the wards of the hospital. Those of the number who showed themselves especially qualified were given temporary assignment as ward surgeons to the hospital, remaining in this capacity until they were ordered elsewhere by the War Department.

The Staff.—The corps of instructors consisted, in addition to the director, of Capt. William J. Bailey, M. C., Capt. William E. Sauer, M. C., Capt. Francis W. White, M. C., Lieut. Frederick T. Hill, M. C., and Lieut. John F. Curtin, M. C. From the outset it was the aim of the school to cooperate in every way with the other special schools. To that end interchange of lectures constantly took place, and the assistance of Lieut. Col. George De Schweinitz, M. C., and Major Meyer Wiener, M. C., of the School of Ophthalmology; Lieut. Col. Edward Martin, M. C., and Captain W. Lee, M. C., of the School of Surgery; Lieut. Col. W. F. Manges, M. C., of the School of Roentgenology; Major Robert A. Keilty, M. C., of the School of Laboratories, in this respect, has been greatly appreciated. Without their help the comprehensive scope that the work assumed would have been impossible. In the same way the director of the school lectured at regular intervals to the School of Surgery, and practical instruction was given to the class, in the methods of examination of the nose, throat and ear.

Conclusion.—As stated in the beginning of this article, the School of Otolaryngology was only a part of the comprehensive plan for postgraduate instruction for medical officers. Scarcely had this country entered upon the war, before the pressing need of such instruction became evident to those in charge of the several training camps for medical officers. All those who had to do with these camps, in any capacity, were agreed that an unwarrantedly high rating had been placed on medical education in this country. So far as otolaryngology was concerned, this was driven home with increasingly painful consciousness the longer the war continued.

At Camp Greenleaf a board of examiners representing the various branches of medicine and surgery met daily to examine every student officer immediately upon his arrival. By this plan, everyone representing himself as interested especially in some one of the specialties was assigned for examination to the director of the particular school. In this way opportunity was given to ascertain the qualifications of several hundred men, drawn from all parts of the country, who claimed to be otolaryngologists, or as having had more or less training in that specialty. The results of these examinations were as astonishing as they were disappointing. Whether in the practice of the specialty for a few years or many years, they all, with few exceptions, showed a woeful lack of knowledge of the fundamentals of the specialty. With increasing emphasis as the weeks went by, the need of adequate and thorough graduate education truly to fit men for such work forced itself upon those to whom the duty of making such examinations was assigned. Inquiry shows that out of the entire number who presented themselves very few had had little more than a six weeks' course of instruction. The all important subject of anatomy was a closed book to them. Such a thing as the physiology of the nose, throat and ear few had any realization of. As for pathology, bacteriology and neurosurgery, these did not enter within their field of knowledge. For most of them, the broad field of otolaryngology, with its many intricate side paths, meant only the ability to remove tonsils and straighten septa.

This alarming lack of qualification on the part of the average otolaryngologist practicing in the cities and towns of this country, as demonstrated by the results of these examinations, serves but to drive home with greater emphasis the need of comprehensive and adequate graduate instruction in otolaryngology. So long as the six weeks' course is given to any and all who are prepared to pay the prescribed tuition, apart from whether proper qualifications are possessed or not, so long will our country continue to be at the mercy of ill trained and uneducated specialists.

The work that the American Medical Association has done in the direction of eliminating third rate medical colleges is the greatest step that has been made in the direction of raising the standard of medical education in America. Something like this is demanded to put special medicine on a proper basis. The best plan to bring this about is yet to be definitely agreed upon. For several years a special committee representing the several national societies of otolaryngology has been working upon the subject, and at the outbreak of the war had reached the conclusion that only by the standardization of postgraduate instruction, the agreement between the leading class A colleges of the country to accept the standard, and then, after satisfactory examinations, to confer a special degree, could the incompetent and untrained self styled specialist be done away with.

The work that has been done in the School of Otolaryngology, Camp Greenleaf, is a step in the right direction. In the event of universal military training, in the light of the experience gained at Camp Greenleaf, the pressing need for the continuation of the various professional schools has been conclusively demonstrated.

XXIV.

MILITARY SERVICE.*

OF

HILL HASTINGS, M. D.,

LOS ANGELES.

At the 1917 meeting of the American Laryngological Association, at the request of Colonel Lister, I volunteered to organize a unit for medical examination at Los Angeles of aviation candidates. This unit was formed in September, 1917, and candidates were examined from all the Southwestern States until the end of the war.

I was particularly interested in the ear examinations made in accordance with the army regulations in which the functional examination of the internal ear was carefully kept. After examining a thousand cases, a report was made by means of a contribution to the Western Section of the American Laryngological, Rhinological and Otological Society (February, 1918). This paper was afterwards published in the ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY (June, 1918). Briefly, the otologic findings showed that the vestibular response in the normal individual as regards nystagmus is as standard a reflex as the knee jerk reflex. Also, with proper care in its performance, the past pointing and falling test developed by turning and checked up by douching is equally as consistent. No candidates, even those who had flown considerably, failed to show a well recognized after-rotation nystagmus. It was concluded that a routine internal ear examination should be made by otologists in all suspicious nerve deafness cases, and that the army procedure had proved to be a good standard to go by. Certain remarks were made regarding precautions that the examiner should consider in order to make the standard tests.

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*Symposium on Military Service of members of the American Laryngological Association.

I received my commission as Captain October 29, 1918; was stationed at Camp Kearny and later at March Field Aviation Camp, Riverside, California. I received my discharge January 11, 1919.

XXV.

REPORT OF THE EAR, NOSE AND THROAT DEPARTMENT, BASE HOSPITAL, CAMP SHERMAN, OHIO.*

BY MAJOR C. R. HOLMES, M. C.,
CINCINNATI.

Major Christian R. Holmes, M. C., was assigned as Chief of this department on August 15, 1917. He visited the camp on August 20, 1917, but as the Base Hospital still existed only on paper, he was not assigned to duty until September 1, 1917, when he reported to Lieut. Col. Wallace DeWitt, Division Surgeon, and Captain (now Lieut. Col.) K. W. Kinard, Commanding Officer of the Base Hospital.

At that date the site of the Base Hospital was only a corn field, with the exception of the pilings for the foundation of two or three ward buildings. Capt. Kinard and Major Holmes were quartered in Barracks B-33. As there were no patients in the Ear, Nose and Throat Department, Major Holmes placed himself at the disposal of the Commanding Officer and rendered such assistance as he could in the supervision of the construction of the hospital buildings.

The first patient operated was Pvt. Joe Armas, Co. M, 331st. Inf., September 26, 1917, for acute mastoiditis, by Major Holmes, assisted by First Lieutenant (now Captain) L. R. Effler and Capt. Kinard. The first patients were placed in ward 9, together with other cases.

There being no equipment for the Head Section, excepting a few poorly selected instruments, it became necessary, in order to carry on the work, for Major Holmes to bring his own instruments from Cincinnati.

The original space set aside for the Eye and the Ear, Nose and Throat Department was a small room, 10 feet by 20 feet, located in what is now the Pathologic Laboratory. It was evident from the first that these accommodations would be entirely inadequate. About September 15, 1917, plans arrived from Washington for the splendidly laid out Head House. On the block plan, this building was to have been located to the north of the officers' ward, but as the county pike and a cornfield not belonging to the hospital occupied this intended site, it was necessary to change the location. Various sites were studied, but as this building was intended for ambulatory cases, not alone of patients from various wards in the hospital but also for dispensary patients from the cantonment, it was finally decided to locate the building on the east side of the square in the center of the group. The accessibility of this centrally located building has since proven the wisdom of this location.

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*Symposium on Military Service of the members of the American Laryngological Association.

While the arrangement of the rooms in the Head House was admirably planned, there were many omissions which were necessary to make an efficient working place, as nearly all of the patients were "pus cases." These minor defects, however, were all remedied, as well as the necessary ventilation in the ceilings of the smaller rooms. The operating room originally planned had an ordinary plain wooden floor. This was changed to a composition floor, such as as used for standard operating rooms.

On November 6, 1917, Major General E. F. Glenn called a meeting of the hospital staff and asked if we were provided with the necessary equipment. The reply being in the negative, he ordered the heads of several departments to proceed to purchase what was necessary in order that the sick should not be neglected. On the following day Major James A. Harvey, Major C. R. Holmes, Lieut. (now Major) Henry Stanbery, Capt. Henry L. Stick and Capt. D. P. Ray went to Cincinnati and made purchases for the several departments amounting to about $10,000. These were delivered on November 10, 1917, by trucks, as the railroad shipping facilities were entirely inadequate and would have entailed great delay.

The Ear, Nose and Throat Department has been enabled to render efficient service because of the splendid facilities and equipment placed at its disposal in the Head House and the special wards. The professional qualifications of most of the men assigned here have been far above the average, thereby rendering the unit an efficient factor.

All new cases admitted to the hospital have first been thoroughly examined by either the Chief or the Assistant Chief. All cases requiring operation have received the final examination, and the most difficult ones have been operated by the Chief, but every man on the service was given an opportunity to act as assistant. Those who proved themselves qualified were given major operations to perform, with the Chief as assistant, the latter watching and, at times, relieving the operator if it appeared best to do so in the interest of the soldier's welfare. Every otolaryngologist sent here was first tried out in the Out-Patient Department, where his professional ability was studied and rated. By special demonstration of patients, blackboards and other drawings and lantern slide exhibitions what might be termed a postgraduate course has been given throughout the year. Daily at 1 p. m., all surgeons in this department met in the Chief's office, each man reporting on cases under his care, with general discussion by those present, and criticisms and suggestions by the Chief.

Outpatient Dispensary.—In order to systematize the work in the Head House, the following schedule has been in force: 8 a. m. to 12 noon. (a) Operations begin at 8 a. m., general anesthesias coming first, then those requiring only local anesthesia. (b) All ambulatory patients from the hospital wards report for treatment. 1 p. m. to 3 p. m. (a) Outpatients from the line. (b) From 2 p. m. to 3 p. m., officers and their families come for consultation and treatment. 3 p. m. to 5 p. m. Cleaning up of unattended cases.

Extramural Service.—One man was constantly assigned to this service. (During the epidemic, two or more men were assigned.) He was provided with a complete treatment "kit" in a specially designed metal case, and visited every nonotologic ward in the hospital, beginning at 8 a. m., and reporting to the Chief the daily findings of each case. All cases not running a normal course were seen in consultation by the Chief or his Assistant. This service was invaluable in detecting cases early and operating before serious complications develop.

Study of Diseased Tonsils.—In conjunction with the Medical Service and the Bacteriologic Laboratory, this department began an intensive study of cases with infected tonsils. Two thousand five hundred examinations have been made, and so far the tonsils of 400 operative cases have been intensely studied.

Diphtheria Carriers.—Together with the Laboratory and the Medical Service, this department has treated and operated diphtheria carriers (removal of tonsils and adenoids). These tonsils were all subject to bacteriologic examinations, and several persistent cases were promptly cured by the operation. One unusual case, having been under observation in the hospital for six months, persisted, in spite of the removal of adenoids and tonsils, until a radical Killian operation for chronic purulent sinusitis was performed.

The acute infectious diseases naturally furnished most of the cases involving the middle ear and nasal sinuses.

(a) Influenza.—While many cases of acute otitis media with mastoiditis came to operation during the first eight months of 1918, we had not a single case of sinus thrombosis, but during the influenza epidemic we had four in ten days, all with hemolytic streptococci in the blood. While last winter the mastoid cases were practically all of the nonhemolytic type, nearly all recent cases have shown positive hemolytic streptococci, with great virulence, requiring early operation—even as early as the fifth day, with pus filling all mastoid cells, with perisinus and extradural abscesses.

(b) Measles.—During the months of February and March, 1918, 725 measles cases were examined by this department upon their admission to the hospital, and 35 cases of acute purulent otitis media, or about 8 per cent, were discovered. There were also found two cases of edema of the larynx requiring tracheotomy.

(c) Scarlet Fever.—During February and March, 1918, 245 cases of scarlet fever were examined by this department upon their admission to the hospital, and 30 cases, or about 12 per cent, showed acute purulent otitis media. However, it must be borne in mind that many more cases of purulent otitis media developed at a later date, both in the scarlet fever and the measles cases.

(d) Mumps.—During March, 1918, 450 cases of mumps were examined upon their admission to the hospital, by this department, for ear complications. Seven cases of acute purulent otitis media were found, but not a single case of total deafness in either ear was encountered, as is sometimes the case in children.

Operations and Treatments.—The first operation performed in the present Head House was made on November 22, 1917, and since then 2,712 operations have been performed in the Ear, Nose and Thoat Department, and 47,923 treatments have been given. The total number of cases admitted to wards on this service was 3,694, and the total number of patients treated in the clinic was 6,496 (figures to April 1, 1919).

Streptococcus Epidemic.—During March, 1918, the hospital became greatly overcrowded with patients suffering from contagious diseases, compelling this service to place as many as 52 beds in wards intended for 32. During this period the virulence of the streptococcus infection became very marked, no doubt, in part due to the overcrowding. To offset the ill effect of this, all windows in the wards on this service were kept open 12 inches from the top, day and night, in spite of the cold weather, extra clothing and bedding being provided for the patients. During March there were three deaths from meningitis and one from abscess of the brain in our service. We regret greatly that an order was issued at that time forbidding all postmortem examinations.

Examination of Aviators.—During the first three months of 1918, and previous to that time, many candidates for air service were examined in the Head House, under the direction of the Chief of Head Surgery. After April 1, 1918, examinations for aviation candidates were stopped at Camp Sherman.

From time to time this department prepared for publication papers on different subjects. So far but one paper has been published. The paper is entitled "A Presentation of Fifty Mastoid Cases Before the Base Hospital Officers' Club, April 4, 1918." The paper will appear in the forthcoming issue of the Annals of Otology.

The following papers have been prepared and will be ready for publication at an early date:

"A Presentation of 128 Mastoid Cases, with Detailed History of Each Case and Statistical Report."

"A Study of (about) 1,300 Tonsil Cases, with Statistical Report."

"A History of the Epidemic of Influenza, from the Standpoint of Otolaryngology."

"A Paper on Sinus Thrombosis."

In addition to the above, interesting individual cases will be written up. Illustrations have been made for these articles, and the papers will be ready for publication soon.

XXVI.

MILITARY SERVICE*

OF

LIEUT. COL. J. M. INGERSOLL, M. C., U. S. A.,

CLEVELAND.

First Lieutenant, Medical Reserve Corps, June 5, 1915. Captain, April 2, 1917. Major, May 24, 1918. Lieut. Col., April 24, 1919. Began active duty July 25, 1917. Organized the Physical Examining Unit for Aviation Section, Signal Corps, at Western Reserve University, July 25, 1917.

Transferred to the U. S. A. General Hospital, No. 11 (the Hospital for Head Surgery), Chief of the Otolaryngologic Department, May 6, 1918.

Transferred to the Surgeon General's office, Washington, D. C., March 4, 1919. Released from active duty and returned to the Medical Reserve Corps, March 17, 1919.

The paper which I read this morning before the association gives a rather brief account of some of the work in the Otolaryngologic Department at the Hospital for Head Surgery. I should simply like to say, in addition to this account of our activities at No. 11, that the whole work was one of the happiest periods in my life.

Our commanding officer, Colonel Paul F. Sraub, was an unusually high type of man, and my associations with him, and with all of the other men on the staff, were most cordial and pleasant.

The work of the teachers, in the Section of Defects of Hearing and Speech, deserves special mention. All of them made sacrifices to enter the service, and their skill and loyal work and the results which they obtained contributed much to the success of the work.

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*Symposium on Military Service of the members of the American Laryngological Association.

XXVII.

OTOLARYNGOLOGY AT CAMP LEWIS.*

BY MAJOR ROBERT LEVY, M. C., U. S. A.,

DENVER.

During the first few months at the United States Army Base Hospital at Camp Lewis I served in a subordinate capacity. This gave me an excellent opportunity of observing military practice and contrasting it with that of civil life. The former has much to recommend it, and many of the trying and often trivial annoyances of civil practice are not met with, much to one's relief.

The keynote of military service is accuracy. Doubtless many others were struck with the vast problem the medical department had to contend with in an attempt to systematize with accuracy and uniformity the service of a large number of medical men, some of whom were insufficiently trained. This was especially apparent in the difficulty encountered in recording case histories. It is my firm conviction that in this as well as in all other branches of the medical corps, our final reports and ultimate conclusions are of much less value because of insufficient and inaccurate recording of clinical observations.

Operations.—In order better to control and systematize the question of operations it was found advantageous to adopt the following form, known as "Request for permission to operate." This was made out by the officer recommending the operation:

Date..................................19........

Register No..........................

Name and Rank...

Request permission to operate for...............................

....

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(Diagnosis)

Indication for operation..

....

....

Quarantine, Ward or Company.......................................

Evidence of acute inflammation......................................

Laboratory Report:

Urine.................................... (Signed)

....

Throat Culture:

....

....

....

....

Admitted to Hospital ....

The laboratory report was initialed by the Ward Surgeon. The "received" stamp was dated and initialed by the chief before the request was sent to the ward; an "approved" stamp was dated and initialed by the chief after all requirements had been complied with, and an "operated" stamp was dated and initialed by the officer operating.

Owing to exposure to contagious diseases incident to recruiting and camp conditions, it frequently happened that soldiers operated for minor ailments were stricken with one of these affections shortly after operation. Care as to quarantine and thorough examination for acute inflammatory manifestations did not always prevent a case of scarlet fever, for example, from occurring in an operated patient to the obvious detriment of the patient as well as to the previously clean ward. In order to avoid this no case was operated upon until after three days of observation in the hospital.

The importance of preliminary urinary examination in all cases, even in those of minor character and requiring only local anesthetic, was illustrated in a serious result following a simple operation, in which it was subsequently determined that the patient was a diabetic.

Variety of Cases Seen.—It is worthy of note that an unusually large variety of diseases of the ear, nose and throat reported at the clinic and hospital for treatment. There was not the dull monotony one had reason to expect in such a service. Rare affections were occasionally seen, of especial interest was an unusual case of angioma of the uvula, of very large size and extending to the soft palate. A radical operation by Captain C. W. Pierce of my service resulted in complete cure. Othaematomata were commonly seen and an opportunity to try out various methods of treatment was given us. A unique treatment which was here adopted following the suggestions of a Seattle man was the following: The othaematoma was incised and a firm metal or hard rubber tube was inserted; the entire ear was then enveloped in a box of plaster of Paris, the tube remaining exposed. Suction was applied to the tube daily and at the end of two or three weeks the dressing was removed, with most gratifying results.

Tonsillectomy and Adenoidectomy.—As elsewhere, diseases of the tonsils constituted an extremely large portion of our service. The question of tonsillectomy and its complications and the question of the tonsils as foci of infection came in for the usual extensive consideration. The method of operation carried out at Camp Lewis was by dissection and snare; local anesthesia was the rule. Slight differences in technic, both as to operation and anesthesia, were in accordance with each officer's practice. In no instance was local anesthesia followed by serious effects. Post-operative complications were infrequent. In a series of 540 tonsillectomies and 146 adenoidectomies only 31 post-operative complications were reported with sufficient accuracy to warrant consideration. Of these, 23 were post-operative hemorrhage and nine presented some infection; one case having both.

Hemorrhage as a rule was "delayed primary," true secondary hemorrhage being rarely seen. One serious case of secondary hemorrhage occurred following adenoidectomy; bleeding was very profuse, and was only controlled by a postnasal plug after all other methods had failed.

Infection was manifested by rise of temperature, stiffness of neck, and abscess. There were no fatalities.

Focal Infection.—An attempt was made to arrive at some definite conclusion relative to tonsils and accessory sinuses as foci of infection, particularly as regards arthritis. It must be confessed that the unsatisfactory character of many of the records was a decided handicap to this study. However a sufficient number of conclusive cases was recorded to make the study worth while. In a series of 200 case of arthritis 50% were believed to have some relation to the tonsils as a focus of infection. A conservative view of this question was always maintained.

An average example is the following:

Diagnosis.—Articular rheumatism. History: Recurrence for past thirteen or fourteen years; in hospital 51 days. After 38 days of general treatment, during which time the patient was on crutches, tonsillectomy was performed. Thirteen days after operation crutches were discarded and patient was sufficiently improved to be discharged.

A review of all cases justified the following conclusions:

1. Tonsillectomy may effect improvement or cure in arthritis.
2. The number of cases cured was few compared to the total number of cases of arthritis treated.
3. The most satisfactory cases were the acute or recent cases, which generally gave a history of sore throat, although this was not invariable.

Meningitis Carriers.—An interesting study of carriers of meningococci was carried out to determine the pathology, if any, that might be found in the nose and nasopharynx. It was an interesting observation that in no case was the meningococcus recovered from the nose or tonsils, but in all instances the habitat of these microorganisms was solely the nasopharynx. The highest average number of days in the hospital occurred in those cases showing adenoids, these being small or of moderate size, although it was worthy of note that 38 per cent of the cases studied presented no lesion in the nasopharynx. These remained in the hospital an average of 45 days as compared with an average of 61 days for those showing some pathology.

Vincent's Angina.—A diagnosis of this disease was frequently based upon laboratory reports, and even though no clinical signs were presented, these cases were isolated. It is believed that this practice was in a large measure unwarranted, for it is a well-known fact that the fusiform bacilli and spirilli may both be recovered in the throat and around the gums of clinically normal mouths. Sore throats, even of slight degree, showing the presence of these organisms should, however, be considered potentialities for the spread of this infection. No serious cases of Vincent's Angina were observed although many were detained in hospital two weeks or more until negative smears were obtained.

Mastoiditis.—During the early part of the year an epidemic of scarlet fever and measles being prevalent, a large number of ear complications occurred. Of these, although a greater part occurred in the progress of measles, fewer developed mastoiditis than did the scarlet fever cases. The most notable feature of these cases was the rapid and extensive destruction of bone. Dura and lateral sinus were often exposed and perisinus abscesses evacuated. Convalescence was prolonged, secondary suturing being necessary in several instances.

In infectious diseases much can be done to prevent ear complications, and to modify them should they occur. The following prophylactic measures were instituted:

1. Daily survey of all cases of measles and scarlet fever.
2. Careful cleansing of nose and nasopharynx. The establishment of good drainage by reducing the swelling of the nasal mucosa by the use of cocain, adrenalin and argyrol.
3. The patient was instructed as to the proper method of blowing his nose.
4. Prompt myringotomy.
5. Early mastoidectomy.

Influenza and Bronchopneumonia.—The following ear, nose and throat affections were noted:

Otitis media, suppurative acute.
Mastoiditis, suppurative acute.
Otitis media, nonsuppurative acute.
Epistaxis.
Rhinitis, acute.
Sinusitis, acute.
Pharyngitis, acute.
Tonsillitis, acute.
Tonsillitis, follicular acute.
Tonsillitis, suppurative acute.
Laryngitis, acute.

The most distinctive feature of these diseases was their comparatively mild character. It was, however, worthy of note that those cases showing ear, nose and throat complications developed these after admission to the hospital, giving the impression, especially in the more severe cases, that these manifestations occurred as late complications. Many reported for treatment after discharge from the hospital.

Early and free incision of membrane tympani was the rule, and it is firmly believed that rapid convalescence and the comparatively few mastoid complications were the direct result of early myringotomy.

In order early to detect ear complications a daily survey of the influenza wards was carried on with gratifying results. Not only did the special survey officer detect unsuspected cases, but the ward surgeons were on the qui vive for their development.

Postmortem study of cases of influenza and bronchopneumonia without mastoid signs was undertaken in twenty instances because it was believed that in certain cases local symptoms were so mild as to be overlooked. In these cases both mastoids were examined. In eight, one or both mastoids showed changes such as congestion, softening, milky or purulent fluid. Cultures of these mastoids showed bacteriological growth in only two, one being staphylococcus hemolyticus and the other pneumococcus.

Conclusion.—At the United States Base Hospital, Camp Lewis, every opportunity was given for thorough study of every case, original research was encouraged and hearty cooperation of chiefs of every department and that of the commanding officers was the rule.

XXVIII.

MILITARY SERVICE.*

OF

HANAU W. LOEB, M. D.,

ST. LOUIS.

Commissioned Major November 6, 1917.

Commissioned Colonel M. R. C., April 12, 1919.

I.—MANUAL OF MILITARY SURGERY OF THE EAR, NOSE AND THROAT.

On December 1, 1917, I was assigned to duty in the Surgeon General's office in connection with the publications of the section of otolaryngology.

Under instruction of Colonel Parker, head of the Division of Surgery of the Head, and of Lieutenant Colonel Mosher, head of the Section of Otolaryngology, I proceeded to prepare a manual on Military Surgery of the Ear, Nose and Throat, for the use of otolaryngologists in the service.

Inasmuch as it was felt that the commissioned otolaryngologist did not require elementary instruction in otolaryngology, it was determined to summarize the war literature of otolaryngology, and to condense and to prepare it in such a way as to make it available for officers in service.

It was found that a vast amount of literature pertaining to the otolaryngology of the current war had accumulated and it was necessary to consult more than 1,100 books and papers in the accomplishment of the accepted task.

The text was completed on March 1, 1918, and the publication entitled "Military Surgery of the Ear, Nose and Throat" was issued about June 1st, under the designation "Medical War Manual No. 8, authorized by the Secretary of War and under supervision of the Surgeon General and the Council of National Defense."

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*Symposium on Military Service of the members of the American Laryngological Association.

The book, which is of a convenient size for carrying in the pocket, consists of 176 pages, printed on thin paper. The chapters comprise the following:

1. Injuries of the External Ear.
2. Injuries of the Middle Ear.
3. Injuries of the Internal Ear.
4. Psychoneuroses of Hearing and Speech.
5. Reconstruction and Reeducation.
6. Miscellaneous.
7. Injuries of the External Nose and Nasal Cavities.
8. Injuries of the Accessory Sinuses.
9. Injuries of the Throat.
10. Injuries of the Pharynx and Esophagus.
11. Injuries of the Larynx and Trachea.
12. Paralysis in Connection with Wounds of the Throat.
13. Stenosis of the Larynx and Trachea.
14. Miscellaneous Nose and Throat Conditions.
15. Malingering.
16. The Ear and Aviation.

The subject matter is divided into two portions: The first contains a more or less dogmatic expression of the writer's opinion, gained from his previous experience and from his study of the war literature; the second, under the heading of "Comment," offers a review of the literature in detail.

The preface contains the following: "Due acknowledgment is here made to the medical officers connected with the Section of Otolaryngology in the Surgeon General's office for their advice, interest and cooperation, which have been a source of great encouragement in the preparation of this little study of the Military Surgery of the Ear, Nose and Throat."

II. SURVEY OF HEAD SURGERY.

On April 12, 1918, I was assigned to prepare a monthly publication for the Division of Surgery of the Head, containing,

1. Abstracts of published articles on head surgery pertaining to the war.

2. Abstracts of published articles of special interest to the Division of Surgery of the Head.

3. Articles pertaining to this Division and reports of cases

by members of the Medical Corps and of the Medical Reserve Corps.

4. Any other matter deemed of importance to the Division.

The purpose of this publication as expressed in the first number was:

1. To provide medical officers with a condensed survey of the war literature of head surgery and of non-military literature of importance to those interested in head surgery.

2. To stimulate the writing of reports and of papers giving the result of study and experience of officers assigned to this Division.

3. To provide a medium by which such reports and papers may take a place in medical literature and be made available for those concerned in this branch of medical science.

The "Survey of Head Surgery" as the publication was designated made its appearance August 1, 1918.

There were altogether six numbers issued beginning with August, 1918, and ending with January, 1919, a total of 288 pages.

It was found very easy to secure the assistance of medical men, not commissioned, who gladly gave their time in the preparation of abstracts for this publication.

Special mention should be made to the following for their service in this regard:

Lieut. Colonel Harris P. Mosher, Lieut. Colonel G. de Schweinitz, Major Robert H. Ivy, Major G. V. I. Brown, Major Charles Bagley, Dr. Edward Jackson, Dr. Joseph Charles, Dr. Clarence Loeb, Dr. Wm. F. Hardy, Dr. Ernest Sachs, Dr. Sol Hyman, Dr. Charles Elsberg, Dr. Holbrook Lowell and Dr. Albert Miller.

III. OPERATIVE SURGERY OF THE EAR, NOSE AND THROAT.

During this period, with Lieut. Colonel Mosher, I was also engaged in preparing a manual on Operative Surgery of the Ear, Nose and Throat for the use of commissioned otolaryngologists. Almost half of the text was completed when the armistice brought an end to the work as well as to the necessity for continuing it. A number of drawings of unusual excellence were made by Corporal I. F. Summers, who was assigned for that purpose by Col. W. S. Owen, Director of the Army Medical Museum.

IV. SERVICE AT JEFFERSON BARRACKS POST HOSPITAL.

On October 1, 1918, I was assigned for duty at Jefferson Barracks, Mo., and was placed in charge of the Otolaryngologic department of the Post Hospital.

Shortly after my arrival, the influenza epidemic appeared and of the 7000 men on duty at that post over 2000 were affected, nearly 400 being attacked by pneumonia with approximately 150 deaths.

The epidemic lasted three weeks, though of course, the complications continued for a longer period. Casuals came in from time to time, but the Post epidemic practically subsided in three weeks.

1. Ear complications of influenza. Altogether there were 50 cases of ear involvement, limited almost exclusively to the middle ear and external auditory canal.

Myringotomy was performed as soon as there was the slightest indication. Within two days the discharge had ceased in all but two cases and the tympanic membrane speedily resolved without complication.

In one instance the discharge continued for a week and in another case, a bilateral otitis media, it persisted for a month, in the typical way.

The acute middle ear condition was frequently accompanied by blister formation in the external auditory canal.

Mastoid tenderness occurred in one case for two days and in another for a week, both recovering without operation.

One case of meningitis followed by death occurred, but there was no evidence of aural origin either from the symptoms or from the myringotomy which was performed for exploratory purposes. No autopsy.

2. Nasal complication of influenza. There was almost no nasal inflammatory accompaniment of the disease. In only a single instance was there a suspicion of frontal sinus involvement and this cleared up within a week without evidence of suppuration.

3. Pharyngeal Complications of Influenza. Most of the patients had a mild pharyngitis, some with mild tonsillitis, one

with a peritonsillar abscess, but in this case the presence of influenza might have been doubted.

Shortly after the epidemic several companies of negroes came from Camp Funston. Within a few days a very large percentage of them were taken with an acute lacunar tonsillitis, quite different from the throat condition which accompanied the influenza epidemic.

4. Larynx Complication of Influenza. A few cases of acute laryngitis occurred, but they were soon relieved in the usual way.

Two cases of laryngeal ulceration were observed greatly resembling those described by Major F. D. Owsley (Survey of Head Surgery, Nov. 1918, p. 94) one very mild lasting two days, the other bilateral persisting for a week.

5. Impressions derived from a study of the otolaryngeal manifestations of the influenza epidemic. The otolaryngeal manifestations of the epidemic as I observed them bore no resemblance to those of previous so-called influenza epidemics. The difference between them is so marked that I cannot see how they can be identical. If they have the same primary cause, it must be susceptible of great modification by circumstance, when the effects are considered. The otolaryngeal differences between this epidemic and those previously observed by me were:

1. Infrequency of otitis media suppurativa and its rapid resolution.
2. Absence of mastoid and intracranial complications.
3. Absence of paranasal sinus involvement.
4. Absence of lacunar tonsillitis and other manifestations of severe tonsil infections.

V. DISCHARGE.

I was honorably discharged from service, December 11, 1918.

VI. CONCLUSION.

Military service was an unexpected incident in my medical life. Even for some time after the declaration of hostilities, I had thought that my administrative duties in connection with the Deanship of the St. Louis University School of Medicine justified me in not applying for a commission, more especially in view of the Surgeon General's advice in this respect.

However, Drs. Richardson and Mosher soon convinced me that the school requirements should give way to the country's call, and I can never fully express my gratefulness to them for the opportunity which they gave me to serve.

My experiences have been pleasant in every respect, my superior officers were considerate and helpful and my associates courteous and devoted to their duties.

It was three months after my application was made before I was commissioned. To obviate this in the future, I have accepted a commission in the Officers' Reserve Corps, which I hope to hold so that I may be ordered to duty hereafter whenever I am needed without waiting for the formality and delay which application for a commission entails.

XXIX.

WAR ACTIVITIES*

OF

MAJOR JOHN L. LOWMAN, M. D.,†

CLEVELAND.

Dr. John H. Lowman was commissioned a Major in the American Red Cross and was made the Medical Director of the Red Cross Tuberculosis Commission to Italy.

He sailed from New York on September 18, 1918, and landed at Bordeaux. The commission then went to Paris and after a short stay there proceeded to Rome. A few days after reaching Rome, Dr. Lowman was taken seriously ill with influenza. In spite of his illness, he was vitally interested in the work in Italy and kept in constant touch with the men on the medical staff. During the month of December, 1918, he was able to be in his office for consultation with the other medical men, but his physical condition was such that it was deemed wise for him to return to America, and he sailed for home early in January, landing in New York on the 21st day of January, 1919. He went directly from the ship to the New York Hospital and died there on January 23, 1919.

His military record is typical of his whole life. He gave, without limit, of his ability for the benefit of others.

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*Symposium on Military Service of the members of the American Laryngological Association.

†Written by a friend.

XXX.

A BRIEF REPORT OF THE ACTIVITIES OF THE DEPARTMENT OF OTOLARYNGOLOGY OF THE AMERICAN EXPEDITIONARY FORCES, FRANCE.*

By Col. James F. McKernon, M. C., U. S. A.,

SENIOR CONSULTANT, EAR, NOSE AND THROAT SURGERY, AMERICAN EXPEDITIONARY FORCES.

This paper is a copy of the one presented to the American Otological Association at Atlantic City, June, 1919, and is published here by the courtesy of the American Otological Association.

In presenting to you a brief history of the Otolaryngologic Department of the American Expeditionary Forces, I can perhaps do no better than to give you at first a general outline of what the department was at the time I was appointed Director and Senior Consultant. At that time it had not arrived at the dignity of the above name, but was known as the Department of Ear, Nose and Throat Surgery, and was merely an offshoot of the department of general surgery.

The first duty of the Chief Consultant was to list all the Base, Camp, Evacution, Mobile and Field hospitals and divisional areas thus far established, with their personnel and equipment. Second, to obtain a list of the otolaryngologists already on duty in France and England and to classify them. Such a list was not available in the Chief Surgeon's office. This necessitated visits to all the various hospitals as well as to the divisional training areas. His third duty was to obtain if possible a classified list of all the otolaryngologists in America who were available for overseas duty. For this list and for others that followed, the thanks of the department are due to Colonel Parker and to Lieutenant Colonel Mosher of the Surgeon General's office.

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*Symposium on Military Service of the members of the American Laryngological Association.

The inspection of hospitals showed that when the Senior Consultant was given charge of the department there were seventeen Base Hospitals actively functioning, with only one otolaryngologist on duty in each. There were already fifty Camp Hospitals established, thirty of which were not functioning. Only ten of those actively functioning had an otolaryngologist assigned to them. The total roster of officers doing ear, nose and throat work for the American Expeditionary Forces at this time was thirty-two. Following is a summary of the equipment or rather the lack of equipment for this work in the hospitals of the American Expeditionary Forces at that time.

Base Hospitals.—One-third of the Base Hospitals operating were lacking in instruments and equipment to adequately care for the patients they were receiving.

Camp Hospitals.—Of those functioning, only two had sufficient instruments and equipment to properly care for cases.

Evacuation Hospitals.—In only one was an otolaryngologist on duty, with practically no instruments or equipment with which to work.

Mobile Hospitals.—None of those established early had an ear, nose and throat surgeon connected with it.

Field Hospitals.—In none of those functioning was there an otolaryngologist or any instruments or equipment for use in this department.

Divisions.—There were six otolaryngologists on duty with various divisions. Later the number was increased as requisitions were made, but at no time during activities were there sufficient officers from this department to meet the demands made upon it.

From the above summary it will be seen that in reality there existed no ear, nose and throat department except the service in the seventeen Base Hospitals, and in those there was no uniformity of standard as to the work performed. This lack of available men on the ground coupled with the fact that only a small number were occasionally landing in France and England, handicapped very much the early activities of the department. It was found also that while there was an ear, nose and throat man assigned to each of the Base Hospitals, he was supposed to remain there, and for the first six months this ruling held good, even though in many instances two or more men were assigned to the same hospital; and even though some of these hospitals were not actively functioning at the time, their Commanding Officers with few exceptions, would not allow the officer an assignment for temporary duty elsewhere.

By May, however, we succeeded in obtaining competent men from many of the Base Hospitals, replacing them for the time being with men who were arriving, or with men who had been tried out on front line work and were found more suitable for Base Hospital work. With these men obtained, and with others who were arriving from time to time, all of our Evacuation and Field hospitals at that time were manned, and the remainder assigned to divisional work.

Before an otolaryngologist was assigned to duty with the divisions, it was not unusual to have from 250 to 400 men report sick each morning to the Divisional Surgeon. At least one-half of these cases were suffering from colds and minor complications resulting therefrom. The usual mode of procedure at that time, was to send these men to some Base Hospital in the rear, where they were treated for a few days, and then sent to a replacement depot, where they were held from three to six weeks, and then finally returned to their organization. As soon as an otolaryngologist was assigned to duty with these divisions an infirmary or dispensary was constructed, and at least 50 per cent of the men presenting themselves for morning sick call with colds and their sequelæ were treated and returned to duty the same day. Of the remaining 50 per cent, about 40 per cent remained in the infirmary and received treatment for from one to three days, and were then returned to duty with their organizations, thereby saving transportation and loss of man power, both of which at that time were sadly needed. The remaining 10 per cent it was found necessary to route to Base Hospitals, where they received the more protracted care and treatment needed.

This system which was first put into practice by this department was later adopted in the divisions by every department of medicine and surgery, the net result being a conservation of man power when most needed as well as a welcome relief to an already overcongested transportation service. While some of the Base Hospitals were well equipped with instruments and supplies, the majority were not, and this was especially true of those that came over during the summer and autumn. Many of these upon landing had no instruments or equipment whatever with which to function, the result being that much valuable time was lost to the service at a period when every hospital and man was sadly needed.

Our Medical Supply Depots at no time carried sufficient instruments and supplies to properly equip a hospital in an emergency, and those instruments they did supply for our department were so few in number and so antiquated that had it not been for the fact that many of the medical officers brought their own instruments hundreds of cases could not have received treatment at all, for with the exception of buying an instrument here and there that had been discarded by the French during the earlier period of the war, none could be obtained in France. Later, however, this scarcity of instruments and supplies was not such an acute problem, although the supply was always inadequate to the demand.

Hospital Centers.—Where several Base Hospitals were established at one place a set of buildings was assigned to this department, so that all the work in the center was segregated. Special wards and operating rooms were arranged, and examination and treatment rooms for ambulatory patients fitted up, and a staff formed composed of officers from the units of the Center. This obviated duplication of instruments and equipment, and resulted in better care for the patient, besides allowing the excess officers in the department to be made available for duty elsewhere.

Center Consultants.—In all the large Hospital Centers a Consultant was apointed whose duty it was to have a general supervision over the work of the Center and act as Consultant when called upon by the Center Staff or the individual units. This arrangement proved most satisfactory, resulting in a better care for the patient, besides maintaining a more rigid discipline for the staffs of the Center.

Among the duties of the Senior Consultant was that of visiting all the Base Hospitals as frequently as possible, seeing cases in consultation and operating when necessary, and consulting as to the needs of the service with both the Attending

Surgeon of the department and the Commanding Officer of the hospital. During activities visits were constantly made from one Evacuation, Mobile and Field Hospital to another, seeing cases in consultation and advising as to the proper care and routing the cases, and later following up these cases that had been routed to Base Hospitals in the rear, and consulting as to the nature and amount of reparative work to be done.

Care and Treatment.—Upon a request from the Chief Surgeon, a circular dealing with the care and treatment of cases in this department was prepared and sent to all hospitals in the American Expeditionary Forces, as many cases were being hospitalized unnecessarily for minor operative work. Upon receipt of this circular much of this unnecessary work ceased.

Classification and Standardization.—A working schedule for the classification and standardization of ear cases was submitted to the Chief Surgeon, believing that it would simplify the work in this department as well as aid the disability boards in classifying the cases that must come before them.

Routing.—When possible, all cases requiring immediate special reparative work were routed to hospitals in the advance zone, where this type of work could be best cared for and frequent observations made. Those cases that could be transported longer distances were routed to Base Hospital No. 115, where a special staff of officers for reparative work was located.

Records.—The ordinary history sheet used in the army was all that was required, but in many instances this was supplemented by a more complete history from a specialistic standpoint. All officers in the department were urged to obtain and keep complete records in full, and maintain a standard of uniformity. As Consultant I was frequently asked by both regular and reserve officers what need there was for an otolaryngologist being assigned to an Evacuation, Mobile or Field Hospital. At first my answer was "to care intelligently for case in his department." Later experience modified my views on this subject very much. I now believe the field of an otolaryngologist in an Evacuation, Mobile or Field Hospital is a limited one, owing to the fact that there are but few wounds that would naturally come within the province of the surgeon in this department that are not multiple, the majority of which concern the general surgeon only. For this reason, especially when there are only a limited number of men available, it is unnecessary to assign a man from this department for duty at one of these points unless he has had a general surgical training that fits him to act as a member of a team doing general surgery. If a member of such a team can act in a general surgical capacity in addition to caring for those cases that by right belong to his department, in such a way only can an otolaryngologist be utilized to a maximum at these points. To assign and maintain one in the front area for this purpose alone would be wasting his time, as his services are more urgently needed in the Base Hospitals of the advanced zone and in large Hospital Centers where the special cases are collected. At these places the otolaryngolologic surgeon is needed, where his judgment and skill can be utilized in caring for the acute conditions that present themselves, and for the reconstructive work that will follow on these cases that are to be salvaged for future line duty.

The cardinal principle of front line work in our department was following the example of the general surgeon, a debridement of the traumatized tissue and removal of all loose bone splinters and foreign bodies when present. Through and through penetrating wounds were closed primarily. In all cases where wounds were open and there was a tendency to contraction with increased separation of the edges, a primary suture was done in order to obtain a better cosmetic result for the future reconstruction work that was to follow. In penetrating wounds of the outer and superior wall of the antrum, no matter how produced, counter drainage was instituted from below. In bullet and shell wounds of the nose, where the bones were shattered, debridement followed by the removal of the loose splinters was the rule, but in no instance was there removal of any piece of bone where there was still an attachment of periosteum. These pieces were approximated as accurately as possible and held in place by some mechanical device so as to allow of nature's repair. In this way much bony structure of the nose was preserved, so that the reconstructive work could be made easier and the future result obtained more satisfactory.

All shell and bullet wounds of the auricle were treated by primary suture. Impacted shell fragments in the external auditory canal were removed and the resultant wound treated by the open method in order to promote drainage, and later, when necessary, plastic procedures were instituted. In shell and bullet wounds of the mastoid process, removal and open treatment was the rule. In penetrating wounds of the skull in the region of the temporal bone of the nasal fossa, a debridement at first was all that was indicated. Later, when the X-ray had localized the foreign body and the patient's condition admitted it, an attempt at removal (which was many times unsuccessful) was made.

In localizing foreign bodies in the brain no instrument gave us as much help by its precision and accuracy as the Hirtz compass, and later this was used in all foreign body cases to the exclusion of all other aids. In no brain case was it permissible to further mutilate the brain tissue by digital exploration. If the foreign body could not be removed by a continuous flow of a warm saline solution or other nonirritating fluid from a syringe, or could not be extracted by aid of forceps, it was let alone, as experience soon taught us that many of the cases recovered by letting the foreign bodies remain in situ. When fractures of the skull occurred all depressed areas of the bone were removed. At first a mistake was made by removing too small an area. Experience taught the error of this, as subsequent hernias were far less liable to occur when a large amount of bone was removed. This is probably due to the fact that a large exposure produces a minimum amount of pressure from within, whereas a small opening makes for a maximum of pressure.

In all wounds of the throat and mouth the principles of general surgery were carried out, always keeping in mind that drainage was an important factor. In reconstruction work of the auricle where a greater portion of it has been destroyed a more satisfactory result was obtained by making casts or moulds and from these constructing an artificial auricle from what was known as Hemming's paste, rather than doing a plastic operation. These were easily placed in position and held by spirit cement and made to conform in color to any skin, and could be easily removed and replaced by the patient at any time. Artificial noses were made in the same way. In some of the nasal injuries it was necessary for respiratory as well as cosmetic purposes to loosen all adhesions and elevate them as much as possible by inserting a piece of cartilage or bone to replace in a measure the trauma existing. In many cases it was found advisable to work on these patients in conjunction with dental surgeons, as appliances had to be fitted and incidental details worked out, and much better results were obtained by utilizing the help of one who had been specially trained in devising, making and fitting these appliances. In the reconstruction work done, no didactic rules could be laid down, as the reparative process depended entirely upon the size, location, shape and condition of the wound and the amount of tissue available for repair. Much less of the reconstructive surgery was done in France than was at first expected. This was owing to the decision made by the Chief Surgeon to return all soldiers to the United States that could not be made ready for line duty in a period of three to four months or less. This decision was in all probability due to our lack of beds at the time.

In many of the cases that confronted us it was quite as important to decide what should not be done as to say what should be done, and in this respect we learned a great deal from both our French and English colleagues, who, by the experience gained in the past four years, were in a measure able to say which cases should be operated upon and which should not. Eighty per cent of the work of the otolaryngologists in France was behind the lines except in the regimental area, and here as well as further back the bulk of it was much the same as that met with in civilian practice and consisted in caring for the acute conditions and their sequelæ. During the influenza epidemic the cases where possible were segregated, and all were treated with warm nasopharyngal irrigations of saline and sodium bicarb. three times a day, using from a pint to a pint and a half at each sitting. This was followed by inhalations, and the air in the wards was kept as moist as possible. This unquestionably proved beneficial, lessening the cough and diminishing the duration of the attack. All mucous membrane irritations due to gas were treated primarily by local applications of lime water or bicarb. of soda. The laryngeal conditions were best controlled by intralaryngeal injections of guaiacol, 2 per cent, and camphor and menthol, of each 4 per cent, in oil.

Considerable criticism was made by some of the men when a circular was distributed through the department relating to tonsils, namely, that no tonsils were to be removed except when markedly hypertrophied or diseased, and never during an acute process. This was made necessary by the wholesale removal of tonsils that took place the first few months, and many hundreds of patients were hospitalized unnecessarily until this order was enforced.

Ear Protectors.—At first there were many and various kinds. Later on all were discarded and gave way to the use of cotton waste moistened in oil or vaselin. This simple mechanical protection was sufficient, as it prevented concussion and maintained a maximum of hearing when worn. It was easy to insert and always obtainable.

Experience has taught us that all hospitals engaged in the care of the sick and wounded should be completely equipped and have the proper assignment of medical officers and nurses when ready to function; and that when assignments are made from the Ear, Nose and Throat Department to Evacuation, Mobile and Field hospitals those officers should be qualified to act as members of surgical teams, either as heads or assistants, as ordinarily there are not enough cases requiring special attention to occupy their entire time in these hospitals. There should also be a center of instruction established for officers of limited experience, so that they may be taught the modern methods of caring for battle casualties. One of the principal points brought forcibly to our attention was that in wounds involving anatomic parts that properly come under this department there was a too extensive debridement of the tissues. In some cases this was carried to such an extent that an immediate reparative process was impossible, owing to a lack of tissue with which to repair, for it should be remembered that in the regions of the ear, nose, throat and face as extensive a debridement is not necessary as in other portions of the body, because of the anatomic difference in the tissues.

Considerable difficulty was experienced in handling men that were assigned to the department from divisions and other medical organizations. Many of these men would claim to be expert otolaryngologists and were assigned to this department because of this claim or because they were doing regimental line work and wished to make a change, stating that their former training had been entirely along otolaryngologic lines. These men with few exceptions, did not know the first rudiments of ear, nose and throat work, and as soon as this fact was established they were transferred to a casual medical camp and subsequently utilized in other capacities.

This brings up an important point for the future consideration of otolaryngologists, namely, that of standardization. Is a man qualified to practice this specialty simply because he claims to be a specialist in this line of work? Or should he pursue a course of study in this specialty at some recognized institution where, after a prescribed course, he be examined didactically and practically, and if successful in such an examination he be granted a specialistic degree? A man taking such a course at an institution chartered with the power to grant such a degree or diploma would at once, in the eyes of the medical world, be looked upon as competent to practice his specialty. If such a standardization were established the self styled specialist would in the future (as far as medical support is concerned) be a thing of the past I feel strongly on this point and speak from experience because of some of the material with which this department was burdened under the guise of specialism.

During midsummer the calls for consultation work became so frequent that it was impossible to respond to all of them, and the appointment of a Junior Consultant was requested. This request was granted, and Major John B. Rae was appointed and assigned to headquarters for duty. This appointment was of great help to the Senior Consultant, as well as being of the utmost help to the department, as it made one or other of the consultants available at all times. During the summer plans were submitted to the Chief Surgeon requesting that one or more schools of instruction be established for officers of limited experience; that this instruction comprise a thorough course on the functional examination of the ear, as well as the routine and operative treatment of nose, throat and ear cases, and that it also include the teaching of reconstructive work in this department. Owing to the lack of available teachers it was not considered advisable to grant this request, but we were given a promise of establishing these courses later. The early signing of the armistice, however, disposed of any further plans the Chief Surgeon may have had toward establishing such a course of instruction.

In some of the camp hospitals only one man was needed to cover the service on the eye, ear, nose and throat. In these instances, through the courtesy of Colonel Greenwood, the Senior Consultant in the Eye Department, an exchange of men between the two departments was made. When the armistice was signed there were 238 officers on duty in the department, and twelve additional held in reserve. When the Third Army was ordered to occupy German territory all the hospitals accompanying them were manned by from one to three officers from this department, in charge of Major Rae as consultant, and all instruments and equipment for the special work that was to be carried on was placed with the Medical Supply depots accompanying the army and requisitioned for use as soon as the hospitals were functioning.

From a personal observation of the French and English hospitals where reconstructive head and face surgery was done, I would most strongly urge that in the event of the United States becoming involved in another war, similar hospitals be established, equipped and surgically manned and ready for work prior to the opening of hostilities, and not wait to see whether or not such hospitals were going to be necessary, as we were told to do in the early days of the war. In my opinion, it is just as necessary that such hospitals be ready to functionate at the beginning as it is that we have base hospitals, if we expect to do our duty as surgeons to the wounded. Such hospitals established early give to the patients a better functional as well as cosmetic result, inasmuch as it insures the work being done early by competent men who have previously specialized along these lines.

My warmest thanks and appreciation are due General Ireland as Chief Surgeon and Colonel Keller as Director of Professional Services, for the help and advice given me at all times. It was their cooperation that made it possible to organize and maintain the department on an efficient basis. To these officers and their associates who had charge of the services in the base hospitals, my own as well as the thanks of the department are gratefully given. It was due to their loyal support and willingness to work at all times in any capacity that made the service efficient for the care of our sick and wounded.

XXXI.

OTOLARYNGOLOGY IN THE WAR.*

By Col. Harris P. Mosher, M. C., U. S. A.,

Boston,

CHIEF OF THE SECTION OF OTOLARYNGOLOGY, SURGEON GENERAL'S OFFICE, WASHINGTON, D. C.

From the nature of things, only necessary operations are permitted in the surgery of the Army. The stock operations in the sections of otolaryngology, therefore, have been myringotomy, mastoidectomy, submucous section of the septum, tonsillectomy, and the incision and drainage of peritonsillar abscesses.

The returns are not all in, so that the following table of operations is only approximate:

TABLE OF OPERATIONS.

Mastoidectomy (simple)	2,175
Mastoidectomy (complete exenteration, or radical), 3.6 per cent	72
Meningitis (complicating mastoid disease) deaths	22
Brain abscess (number of cases)	15
Tonsillectomy	11,646
Tonsillectomy and adenoidectomy	2,396
Adectomy	584
Submucous resection	3,246
Peritonsillar abscess	1,199

There were 14,042 cases of tonsillectomy, with four deaths; two presumably from cocain, one from embolism, which occurred under anesthesia, and one from tonsillar hemorrhage.

The number of peritonsillar abscesses has been very striking. Camp Devens reported fifty in a month, and Colonel McKernon states that overseas one medical officer opened twenty-four in a week. As the total number which has occurred in the army in the United States is 1,199, there is good ground for saying that at least 1,000 more tonsil operations could have been performed with benefit. The majority of the tonsillectomies have been under novocain, procain or apothesin, and all the patients, of course, have been adults. I consider it remarkable that so far only one death from tonsillar hemorrhage has been reported.

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Thrombosis of the lateral sinus has not been very common. Three hemorrhages from the lateral sinuses have been reported, caused by spontaneous rupture of the sinus, four or five days after its exposure in a mastoid operation. The monthly reports bring out the fact that the mastoiditis following measles took a fulminating course and was characterized by early, painless and severe destruction of the cellular structure of the mastoid process. More than one observer has felt that the involvement of the mastoid was often a part of a general blood stream infection.

Holmes reported the cure of sixteen diphtheria carriers by the removal of the tonsils and the adenoids and one cured by a Killian operation. He reported also eleven cases in which nonvirulent diphtheria bacilli were found mixed with streptococci and pneumococci in the aurial discharge of acute otitis media. Friedberg also reported a series of cases of chronic diphtheria carriers cured by operation. The above list gives the standard army operations.

Operations for the replacement of fracture of the nose, usually for mule kicks, the removal of nasal polypi and drainage of the antrum, are next in frequency. A few instances of nearly all the standard operations of otolaryngology are represented in the reports from the camps.

In the early days there were two foreign bodies in the trachea dental: a broach and a peanut; these were sent to Philadelphia to Dr. Jackson. A short time ago, at Oglethorpe, a quarter was removed from the upper end of the esophagus. Tracheotomy has been done a few times for edema of the larynx, probably caused by deep infection.

The following tabulation gives an idea of the amount of work done in one of the most active base hospitals, namely, Camp Sherman:

Number of new cases treated in the ear, nose and throat department	7,210
Number of operations performed in the ear, nose and throat department	2,227
Number of treatments given in the ear, nose and throat department	35,261
Number of deaths	10

At times rather too many secondary mastoid operations were necessary. In one series of 158 mastoid operations 28 reoperations were reported, and eight cases of facial paralysis, six of which were permanent. This is not a good record. Speaking of the character of the work, I said in a previous paper that, on the whole, it has been good; that it has fallen down in certain places—by this I mean that there were too many cases of facial paralysis in operations for acute mastoiditis, too many cases of reoperation, and at times, in a few places, that there was a suspicion of overoperating—is due to the fact that the otolaryngologists of the country who had the training to make the work better did not come in to the service in sufficient numbers to go around.

Leaving this very brief tabulation of operations and turning to a survey of the diseases with which the otolaryngologists has to deal, the reports from the camps show that there has been very little diphtheria. Almost no erysipelas has been reported in connection with mastoid operations, in spite of the fact that the streptococcus has been the reigning organism.

NEW CLINICAL OBSERVATIONS.

A number of new things have been picked up by the otolaryngologists in the cantonments. Major Owsley described a series of cases of ulcerative laryngitis due to the pneumococcus. He saw the cases at Camp Travis and labeled the process a new camp disease. It is distinguished by a superficial ulceration of the anterior ends of the vocal cords. The chief symptoms are hoarseness and aphonia. All of the cases responded readily to the treatment of solutions of silver. Major Eagleton at Camp Dix successfully placed a bone graft from the tibia in the cavity of the mastoid process produced by a simple mastoid operation. Major Eagleton feels that he has a new frontal sinus operation, and Major Fetterolf has confessed to a new procedure for the resection of the nasal septum. Undoubtedly both of these operations will be reported later. At one of the base hospitals there was a run of hysterical aphonia, "Whispering Willies," as they were called. They were turned over to the psychiatrist, who had great success in curing them.

When I was in France a year ago I heard that Robertson had autopsied a number of cases of influenza which showed pus in the sphenoid sinus, the other accessory sinuses being free. Major Bryan, while serving at Walter Reed Hospital, Washington, went through a streptococcus epidemic, and the autopsies gave a similar finding. In addition, in one case there was an odd involvement of the epiglottis and of the larynx. In this war, therefore, the sphenoid sinus has come more and more under suspicion. Eagleton was on the watch to duplicate these findings, but in the autopsies which occurred at Dix the sphenoid sinus was not involved.

Holmes at Sherman and Harris at Oglethorpe have drawn attention again to the manifested advantage of the use of gas oxygen for producing the anesthesia for mastoid operations in pneumonia cases. Two other medical officers, Porter and Orton, have reported a series of similar cases which they operated under local anesthesia.

A report from Camp Zachary Taylor for the month of January, 1918, gives an account of 39 mastoid operations, five of the cases being bilateral. Bilateral operations were not so very rare.

Hill, in a study of the aural complications of the recent influenza epidemic at Fort Oglethorpe, came to the conclusion that in mastoid cases a drooping posterior, superior canal wall did not indicate a suppurative mastoiditis. He still has faith in the other classical signs, namely, increased purulent discharge, thickened periosteum, mastoid tenderness and edema. Major Scott, of Fort Riley, considers that in mastoiditis the chief indication for operation is bone necrosis as shown by the X-rays. The X-rays which he was able to obtain were unusually clear and so enabled him to place great reliance upon them.

The Carrel-Dakin solution, which has figured so largely in the treatment of empyema, naturally has been tried also in the treatment of mastoid wounds. Eagleton feels that the solution gives a cleaner wound and hastens the healing. Scott advocates a dressing of chloramine paste for mastoid cavities. Dakin's solution has been used with good results at Cape May in clearing up cases of chronic running ear.

THE INFLUENZA EPIDEMIC.

The influenza epidemic, which reached the proportions of a plague, or as near a plague as this generation of physicians has ever seen, spent its virulence upon the lungs.

The following account of the epidemic from the otolaryngological point of view is from Shambaugh and duplicates the reports sent in from most of the base hospitals.

"About September 21, 1918, an epidemic (influenza) broke out in Camp Grant. The number of patients in the hospital increased from normal 500 to 3,600, with a daily admission rate running up to 800. The consultation work of this department was enormous. There were over 600 cases observed with otitis media acute suppurative. In most cases there was a spontaneous rupture of the membrane tympani within a few hours of the onset of ear symptoms. The discharge, as a rule, appeared thick and purulent from onset, and did not have the initial stage of a serosanguinous discharge so frequently met with in the ordinary case of otitis media. Many of these cases were complicated by a diffuse otitis externa and very few showed any mastoid reaction. Most of the cases recovered rapidly, that is, in about a week.

"There were, relatively, a small number of cases which showed distinct symptoms of acute sinusitis. Most of the sinus cases proceeded to spontaneous recovery. It seems probable that not a few cases of acute sinus infection passed undiagnosed. Not a single case of sinus trouble required operation.

"Epistaxis was a very frequent complication. The bleeding in these cases did not become serious and no special treatment was instituted to stop the bleeding.

"Culture were made from but a few of the cases. In three cases in which cultures were produced immediately following the paracentesis all showed a pure culture of pneumococcus. In two cases in which cultures were produced from pus washed from the maxillary sinus both showed pure cultures of pneumococcus. Cultures were made from pus found in opening the mastoid in six cases. Four of these showed pure hemolytic streptococcus and one showed a pure culture of pneumococcus."

The initial epistaxis was a striking feature. Green found that it almost always came from a single vessel located in Kesselbarch's circle, but Buff found that it came from the turbinates.

Emerson had the distinction of being made commanding officer of a special influenza hospital of 1500 beds at Camp Lee, and made a striking success of it.

Eagleton experimented with suction for removing the secretion from the trachea of pneumonia patients just after death, his idea being to use it in the living if he obtained results. He found that the secretion was too thick to respond to suction.

The tragedy of the epidemic still awaits a full description. Patients were struck down with the suddenness of lightning. To say that the morgues of the hospitals were overflowing with dead sounds commonplace, because we have heard it said so often. It was, however, literally true. In the camps military funerals were taking place all day long and the hospital flag stayed at half-mast throughout the epidemic. At the railroad stations the coffins which were being slowly wheeled along or lay about waiting for a place in the baggage cars kept the scourge before the eyes of every traveler.

I remember the impression that the flu patients made on me as I went about the crowded wards at Oglethorpe. The virulence of the disease struck me like a blow when the medical officer who accompanied me said: "This man will be dead tomorrow, that one the day after," and none of the patients seemed to me so desperately ill. The fathers, mothers and wives and brothers sitting by the bedsides added to the tragedy and to the general hopelessness.

Only a few doctors died, but enough to show that they were not immune. At last two wives of doctors who either lived in the camp with their husbands or came to visit were victims. One very sad case of this kind occurred at Oglethorpe. The wife of the pathologist died the day before I arrived. After talking it over with his commanding officer her husband decided to remain at his post and carry on his work in the autopsy room, assembling material while it was still available for scientific purposes. On the day of his wife's funeral one of the visiting physicians happened to be in the morgue at noon and found him crowded with work. The physician asked if he could be of any help. The answer was: "It would help if you could stay a little. At this hour my wife is being buried in New York." That was lonely devotion to duty which words of mine cannot adequately appraise.

SUMMARY.

In the beginning of the war the section of otolaryngology was the busiest of all the surgical specialties. At the present time it remains moderately active, but the section of plastic and oral surgery, now called maxillofacial surgery, and the section of neurologic surgery are receiving from overseas more of their special cases than the section of otolaryngology. The section of neurologic surgery is receiving by far the most cases, the majority of them being injuries of the peripheral nerves.

In the United States the two great medical problems of the war have been the control of sputum-borne diseases and the detection and cure of the carrier. The bacteria responsible for sputum-borne diseases gain their entrance to the body in most instances through the tonsils of the accessory sinuses. Experience has shown that the best method of curing a carrier is to remove the tonsils and the adenoid. The war has shown also the supreme importance of accepting in the army only recruits who have a normal nose and throat.

The war has shown further the importance not only of discovering carriers, but of segregating contacts. It has brought out the significant fact that the hospital personnel often act as carriers. In dealing with air or sputum-borne diseases the great value of isolation and the use of substantial gauze masks has been proved. The probable efficiency of the routine spraying of the nose and throat with dichloramin-T has been shown. More experimentation, however, is needed to prove this point. The opinion now prevails that every recruit and every hospital patient should be looked upon as a possible carrier.

In the United States the dominant bacteria have been the pneumococcus and the streptococcus hemolyticus, the latter being by far the most important. The following fact has become more and more evident, namely, that assembling men in barracks, exposing them to cold, and drilling them to the point of over-fatigue has the power to change harmless bacteria into virulent strains.

In head surgery America's greatest contribution has been in the surgery of the jaw. Bridge splinting, the use of bone grafts, the implantation of cartilage to give form to plastic flaps, and the use of the skin graft folded over a plate of modeling compound have greatly advanced maxillofacial surgery.

The fact that so many tonsillectomies were performed with so few deaths from any cause, and only one death from tonsillar hemorrhage, speaks well for the skill of the operators and the type of operation employed. The striking number of peritonsillar abscesses would seem to show that even a larger number of tonsillectomies could have been performed with advantage.

The influenza epidemic was a dramatic and deadly scourge, but the complications produced in the line of otolaryngology were not serious. It emphasized the fact, however, that a normal nose and throat is a great protection.

The otolaryngologists have faithfully and enthusiastically used their specialty for the prevention of disease as well as its alleviation. Their first aim was preventive surgery, and they largely realized it.

In looking backward over our war experience, things are seen which could have been done much better. The following are some of them. Recording them may help another time, if there is another time:

The draft examination should have been more thorough. Too many cases of chronic running ears were overlooked.

There could have been closer cooperation between the camp and the base hospital. There was no provision for an automatic interchange of special personnel.

Special instruments and supplies were late in getting to the hospitals.

Instruments, medical supplies and literature were late in getting overseas.

The hospitals at the port of embarkation should be thoroughly equipped and staffed. Soldiers destined for overseas often arrive at the port of embarkation seriously ill.

In the United States the power to act as consultant should have been given to the chiefs of the sections earlier.

Each medical and surgical section should have a medical officer to act regularly as courier between the home base and the base of operations.

XXXII.

PERSONAL OBSERVATIONS IN OTOLARYNGOLOGY IN FRANCE DURING THE WAR.*

By Major Francis R. Packard, M. C.,

Philadelphia.

Any remarks I may have to make on the laryngology and otology of the war must be of a more or less discursive nature because of the comparatively late time at which I became officially connected with the otolaryngologic service of the A. E. F. I sailed May 17, 1917, with Base Hospital No. 10, the Pennsylvania Hospital Unit, which assumed charge, in June, 1917, of British General Hospital No. 16 at La Treport, France. The hospital had 2,000 beds and was used only for acute cases, patients being evacuated to England or to a convalescent camp or to their units as rapidly as possible. We were one of five or six other British hospitals, located in close proximity. Our hospital received chiefly wounded and gas cases, but also had attached to it a contagious division, which received many cases of diphtheria, scarlet fever, measles and Vincent's angina. The otologic, laryngologic and ophthalmologic work of the entire hospital area had been in charge of Dr. MacDonald, of the Canadian Army Medical Corps, a most competent man. We had brought with us an ophthalmologist as well as myself to look after the eye, nose, throat and ear cases, but neither of us found much to do. Practically all operative work, except for wounds or acute conditions, was forbidden.

Tonsil and septum operations and radical mastoids were forbidden, and consequently, except for occasional foreign body cases in anatomic regions which fell within my province and for occasional cases in the Isolation Division with ear and throat conditions, my duties were very light. I was very forcibly impressed, however, with the very great number of aural cases which occurred among the men and which in civil life should have received appropriate treatment but which were necessarily neglected, owing to the exigencies of active war service. I refer to traumatic ruptures of the membrana tympani, due to concussion, to chronic suppurative conditions of the middle ear with acute exacerbation due to exposure or neglect, and to chronic nonsuppurative disorders of the middle or internal ear, due chiefly to exposure to concussion in artillery fire. Most of the traumatic ruptures of the membrana tympani had developed suppuration, chiefly owing to their having been douched when first seen. Chronic purulent otitis media appeared to be entirely disregarded as a disability, and I operated on several cases which had developed acute mastoid symptoms as a result of exposure and neglect. Even a quite marked degree of deafness did not exempt the enlisted man, and of course such cases became greatly aggravated.

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After some three or four weeks at the hospital I went up to a casualty clearing station with a surgical team, being officially designated as anesthetist. I was very glad of the opportunity to get to the front and felt that I could be better spared from the hospital than most of the other officers, as my duties were so light. There was absolutely no work in our specialty at the front, but there was plenty of work of other kinds. After remaining three months at the casualty clearing station I returned to British General Hospital No. 16. The hospital was now receiving a great number of gas cases, and the laryngeal lesions were most interesting, but chiefly from the pathologic point of view, as there was unfortunately but little that could be done even by the way of alleviating their sufferings. The patients were chiefly suffering from mustard gas, which caused a deep burn through the mucosa involving the underlying tissues and extending from the mouth well into the bronchi. No local applications were of any avail in the pronounced lesions. In slight ones intratracheal injections by means of a syringe of liquid vaselin containing menthol, camphor or oil of eucalyptus seemed to lessen the pain and irritation.

In September, 1918, I was detached and sent to Paris as center consultant in otolaryngology. There were a number of large American hospitals in the center, notably American

Red Cross Military Hospital No. 1 at Neuilly, American Red Cross Military Hospital No. 2 and American Red Cross Military Hospital No. 3, and U. S. Base Hospital No. 41 at St. Denis and No. 4 U. S. Camp Hospital at Joinville. Excellent work was done at them by the otolaryngologists attached to their respective staffs, notably Majors W. Sohier Bryant, Hubby, and H. E. Tucker. There were many mastoid and sinus cases, particularly in connection with the pneumonia and influenza epidemics. The hospitals were well equipped, owing to the energy and foresight of Lieut. Col. James F. McKernan, chief consultant in otolaryngology for the A. E. F., a fact which won the envious admiration of some of our French colleagues who visited them and were most favorably impressed. I, in turn, was much struck with the excellence of the otolaryngologic service in the French military service at Parirs. I visited a number of the clinics, notably those of Luc and Lubet-Barbon, and found much to admire and but little to criticise.

XXXIII.

MILITARY SERVICE*

OF

MAJOR NORVAL H. PIERCE, M. C., U. S. A.,

CHICAGO.

Commissioned Captain, M. R. C., April, 1917.

Entered active service June, 1917, in charge of the Otolaryngologic Department of Illinois Charitable Eye and Ear Infirmary Unit, for Examination of Aviators. Promoted to Major, August 11, 1918. August 31, 1917, was appointed Chief Consultant in Otolaryngology, Camp Grant, Ill. June, 1918, ordered to U. S. General Hospital at Cape May. Sailed for duty with Base Hospital No. 115 at Vichy until December, 1918, when I was ordered to St. Nazaire for duty. January, 1919, ordered to Camp Hospital at La Boule. At Vichy served for a time as Chief Consultant in General Surgery for the Base Hospital center. Afterwards as Consultant in Otolaryngology for the center, as Chief of the Division of Surgery at Base Hospital No. 115. Ordered home February 11, 1919. Time of service, nearly two years.

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XXXIV.

BRIEF HISTORY OF THE EMORY UNIT.*

By Surgeon in Charge Major Dunbar Roy, M. C., U. S. A.,

Atlanta.

The writer entered the service of the Surgeon General's office on June 10, 1917, as Contract Surgeon. This was in response to a telegram to Maj. T. R. Bratton (now Col. Bratton, Commanding Officer at Fort McPherson, Ga.), requesting him to see if the writer would not form a voluntary unit for the examination of men for the Air Service. This was done on June 10, 1917, and the writer's clinic rooms of the Medical Department of Emory University were utilized for holding the examinations.

The personnel consisted of my assistants in the Otolaryngological Department and those of the Medical Department in the university.

The Aviation Board was located at the Georgia School of Technology in Atlanta. The same personnel of the unit continued until orders were received instructing us to examine no further men. This was on February 21, 1918. The unit, therefore, of which the writer was commanding officer, was in existence for eight months.

During this time we examined between thirteen and fourteen hundred men, the large number being due to the many cantonments which were located in this section, and the fact that Atlanta was the center to which men could come in the shortest period of time and with the least inconvenience. It is permissible here for the writer to state that a higher commission was offered him but was refused on the ground that his duties in the Medical Department of Emory University were urgently needed, and it was understood with the Surgeon General's office that if he was willing to keep the rank of First Lieutenant, they would see that he was not transferred from Atlanta.

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But few medical observations were made which differed from those already recorded by men working in the aviation units in different parts of the country. One could not fail to have some practical ideas of his own after having had thirteen hundred men under observation and seen the results of the various tests recorded in these examinations.

The one outstanding observation presented to the writer was the neuropsychic element which existed in all the men who presented themselves for the examinations and tests. There had been so much written and discussed concerning the severity of those tests that the large majority of men approached them with fear and trembling. I am fully convinced that many good men were rejected because this influence on their nervous system was not considered. To take these men into the examination room, yell at them in bombastic tones, upset their whole nervous mechanism with fear, what could be expected from them when delicate tests were applied? As Commanding Officer I always attempted to rectify these defects in the examining unit, and I personally saw to it that each examiner showed mild courtesy to every applicant. In many cases I allowed the man to be examined again the next day, especially if he was of a nervous temperament and had lost sleep in an all night's travel upon the train. This report, however, is not for the purpose of discussing the methods used in these examinations nor the consideration of the importance of one test over that of another. This has been done quite extensively by others, perhaps better qualified by reason of their longer service in the Medical Corps. The writer believes that the eye tests were of more practical value to the men than those of the ear.

Three of these eye tests stood out most prominently: (1) Acuteness of vision, (2) Orientation by means of the stereoscopic test and field of vision, (3) Color perception.

On April 2, 1918, the writer was placed on the inactive list and the Emory Unit was discontinued.

XXXV.

MILITARY SERVICE*

OF

COLONEL CHARLES W. RICHARDSON, M. R. C., U. S. A.,

WASHINGTON.

Dr. Richardson was commissioned a First Lieutenant in the old Medical Reserve Corps, July 5, 1908. Commissioned a Major, Medical Reserve Corps, April 25, 1917. Commissioned a Lieutenant-Colonel, National Army, May 20, 1918. Commissioned Colonel, February 19, 1919, M. R. C.

During the early part of the war Dr. Richardson was employed in numerous inactive and active duties. Among the latter was the chairmanship of the Otolaryngologic Section of the Division of Surgical Specialties, Council of National Defense. During this period Dr. Richardson, with his able assistants, got out all the questionnaires, classified those that were returned, and compiled a card index of the same. During this period also Dr. Richardson was on active duty, making a tour of some of the larger cities in the country for the purpose of increasing enthusiasm among otolaryngologists and thereby increasing volunteers among the physicians in this line of the profession. Later he was again placed on inactive duty. He was created a special commissioner on legislation to see that important active legislation did not take away from the Surgeon General the rights of reconstruction, which was accomplished.

On October 24, 1917, he was placed on active duty, which he continued until his discharge. During this time he was assigned to the Otolaryngologic Section, Division of Surgery of the Head, as acting chief, in the absence of Major Mosher, on a mission overseas. Various activities arose, among the most important of which was the creation of the Army Medical School at Fort Oglethorpe, and the arrangements made for the Section of Otolaryngology. These were finally completed by Lieutenant Colonel Mosher on his return.

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On March 11, 1918, Dr. Richardson was assigned the directorship of the Defects of Hearing and Speech in the Division of Physical Reconstruction. He organized and assigned the personnel, sought the proper habitat for the patients in defects of hearing and speech, and carried out further details in order to make the undertaking a success. During the period of the war 140 patients returned deaf and required speech correction. Of this number of returned patients, over 70 per cent made excellent speech readers. Eighty per cent of the corrective speech cases were excellent, demonstrating the character of the work done. The methods employed met with the approval of all those who had the pleasure of seeing the patients and the work done.

From September 10 to October 30, acting chief of the Division of Physical Reconstruction, during the absence of Colonel Billings overseas.

During his service in the office of the Surgeon General it was always Dr. Richardson's pleasure to aid in advancing the grades among the officers who deserved it, assisting in securing the discharges of officers when it was requested, and doing various acts for the many officers in the service in the section of otolaryngology.

XXXVI.

MILITARY SERVICE*

OF

MAJOR GEO. E. SHAMBAUGH, M. C., U. S. A.,

CHICAGO.

One year's experience in keeping home fires burning.

Experiences at Camp Grant: Otolaryngologic work in the wake of the influenza epidemic. Mastoiditis following influenza, requiring surgical interference. Slow formation of mastoid abscess without symptoms (latent mastoiditis). Type of acute sinus infection following influenza. Efficiency of intranasal drainage for cases requiring surgical interference. Peritonsillar abscesses as a sequel of influenza. Experiences in examining overseas cases suffering from injury to the hearing.

The first year of America's entry into the world war was for me a rather strenuous one. What with teaching at Rush College, giving of special courses for surgeons who were taking up neurologic surgery, writing of chapters for a war manual on Neurologic Surgery, and not least, serving on a medical war board in the evenings, I found my time fully filled, and during this period I acquired a profound respect for those of our profession who were destined to stay out of the regular service in order to keep home fires burning. Nevertheless, as the year wore on, I felt an increasing desire to enter service, and in the spring of 1918 I began to make efforts to get my release from the list of essential teachers, where, as the head of a department in Rush Medical College, I had been assigned when the country entered the war. My release came during the summer, when, taking my examination, I arranged for my courses at the school and awaited my commission and assignment.

It was not until the morning of November 11th, while watching the demonstrations from the window of my office on that eventful day, that the telegram came from the War Department notifying me of my commission and assignment for duty at Camp Grant. I arrived at the camp just after the epidemic of influenza passed over that place and have been at work there until the present time. It was an interesting period when I began my work as Chief of the Department of Otolaryngology at the Base Hospital. The influenza had brought with it a great many cases of acute otitis media as well as acute sinusitis, and while there were a great many cases of acute otitis media in which distinct clinical symptoms of acute mastoiditis were manifest, there were indeed very few which presented the fulminating symptoms requiring surgical interference. There were but few exceptions among these cases presenting well marked symptoms of acute mastoiditis during the early days of the otitis media which did not clear up spontaneously in the course of ten days or two weeks.

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*Symposium on Military Service of the members of the American Laryngological Association.

During the month immediately following the influenza epidemic we met with a rather large number of cases of mastoid disease where the trouble developed often without any external evidence of mastoiditis. These were cases where there was no tenderness over the process and no changes in the overlying structures. In a number of these cases there would be weeks pass with no elevation of temperature or at most 99 degrees, once or twice during an entire week. The diagnosis of abscess cavity in the mastoid process was made by the persistence of a purulent as distinguished from a mucous discharge, which may or may not be profuse. In some cases there was the characteristic flattening of the upper wall of the external meatus, and in some a more or less persistent pain in the temporal region of the same side. It was in just these cases where we found the skiagraph to be of greatest assistance in showing the areas of softening in the depths of the mastoid process. Usually there was but one abscess cavity, the location of which, as well as its extent, was distinctly shown on the plate. On the other hand, the shadow, which is always shown in the skiagraph in the early stages of otitis media, especially where mastoid symptoms are present, was not of special assistance, for we were aware without the assistance of the plate that the pneumatic spaces were filled with inflammatory secretions, and the plates themselves did not give us, as a rule, a definite clew as to whether an actual softening of the bone was taking place.

Our experience with acute sinus cases was very much the same. A great many influenza cases were complicated with well marked symptoms of acute sinusitis. The skiagraph was not at all necessary in making the diganosis in most of these cases. No local treatment other than the intranasal application of a weak solution of adrenalin and cocain to the nasal mucosa was called for. In only a few, where the symptoms were severe and failed to subside promptly in a few days, did we resort to irrigation. In the case of the maxillary sinus this was carried out by means of the Killian tube, puncturing the nasal fontanelle in the middle meatus. Later on, there were a few cases where the sinus infection became chronic or where the lighting up of an old chronic process persisted in discomfort associated with a profuse purulent discharge from the nose. In such cases we proceeded to establish intranasal drainage, first by removal of the concha media associated with the making of a large opening into the maxillary sinus through the middle meatus, the exenteration of the anterior ethmoid cells and the enlarging of the nasofrontal duct, as the case might require. The skiagraph always gave a quick and satisfactory answer as to the sinuses involved. In a few cases the antrum alone was affected, and occasionally the frontal sinus alone was involved. In none of the cases was an external operation necessary.

For a couple of months following the influenza we saw a great many cases of peritonsillar abscess and not a few postpharyngeal abscesses. In most of these cases a pure culture of streptococcus was found. For a time we saw as many as five or ten such cases in a day. Not a few cases of systemic infection followed from these infections and from cases of acute tonsillitis. These complications were chiefly in the nature of rheumatism and endocarditis and occasionally acute Bright's disease. These infections brought to our service a great many cases where the removal of the tonsils was required.

Later in the service, when the overseas wounded began to pour into the camp, and as the demobilization of the overseas units proceeded, we had opportunity for observing a great many cases of injury to the organ of hearing. The cases which presented symptoms of defective hearing gave opportunity for applying accurate methods of diagnosis, especially in the application of the functional tests to the organ of hearing and to the vestibular mechanism. Owing to laxity of examining boards in some quarters, not a few cases were inducted into service which were suffering from chronic suppurative otitis media, and not a few cases of defecting hearing, especially of the otosclerotic type where the drum membrane was normal. These facts made it important that our examination of the retiring soldier should determine not only the degree of disability but should differentiate those cases where the disability had been incurred while in service from those where the defect was clearly due to preexisting ear disease.

The work has been on the whole extremely interesting. Not the least has been the stimulation which all of us felt from coming into contact, as we did, with the finest specimen of manhood in the world, the American doughboy. This experience has in itself been ample compensation for all the petty annoyances incident to military life.

XXXVII.

MILITARY SERVICE*

OF

Lieut. Col. Burt R. Shurly, M. C., U. S. A.,

Detroit.

Dean of the Detroit College of Medicine. Member of the Committee of Three, in company with Dr. Charles W. Richardson and Dr. Harris P. Mosher, to represent the American Laryngological Association, the American Otological Association, the American Medical Association and the American Rhinological, Laryngological and Otological Association for the purpose of conferring with Surgeon General Gorgas as to the employment of specialists in the Medical Corps of the U. S. Army.

Resigned from this committee, entered active military service and was commissioned Major July 25, 1917.

Organized and was appointed Medical Director of the Detroit College of Medicine and Surgery Base Hospital No. 36. Sailed October 27, 1917; arrived November 10th, and was stationed at Vittel, France.

Commissioned Lieutenant Colonel June 6, 1918.

Sailed from France February 8, 1919. Arrived home February 17, 1919. Honorably discharged March 12, 1919. Duration of service, 20 months.

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*Symposium on Military Service of the members of the American Laryngological Association.

XXXVIII.

LARYNGOLOGY IN AN AMERICAN BASE HOSPITAL CENTER, FRANCE.*

By Ross Hall Skillern, M. D.,

Philadelphia.

In a retrospect of the work accomplished during the latter months of the war, when the specialties with special reference to the upper respiratory passages should have reached a comparatively high state of development and efficiency, it is with no small sense of disappointment that one mentally reviews the conditions that were to all intents and purposes universally met with in France during that period.

The writer was stationed at Mesves sur Loire, one of the largest American hospital centers abroad, with actual accommodations for twenty thousand patients, including the convalescent camp. The center was composed of ten base hospitals, each with the capacity of two thousand beds, including the crisis expansion. The individual base hospital units were complete entities with their own operating rooms, laboratories, X-ray departments, etc., and were understood to be in a position to properly treat any case that might come under their care. As a consequence, during the early days of the center, no differentiation was made, but only at a later date were certain units designated to care for special cases, thus contagious diseases to one, influenza and pneumonia to another, orthopedic cases and fractures to another, etc., but I do not recall anyone designated for nose and throat cases.

It is true that a unit did set aside one or two wards for head cases, but these were more particularly mouth and jaw injuries, and were under the supervision of a dentist and oral surgeon. Each hospital unit was equipped with a field set for nose, throat and ear cases and was supposed to have one room solely for this work, but as this specialty was never encouraged this room was seldom in evidence. Despite these discouragements, certain laryngologists endeavored to organize their departments, but on account of the apathy of those in command, together with the inefficiency of the medical supplies and the lack of adequate lighting and water supply, the result was rather crude and totally inadequate for even the proper examination of the patients. Small wonder is it then that little encouragement was held out to patients requiring the use of the nasal or laryngeal speculum.

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*Symposium on Military Service of the members of the American Laryngological Association.

ACTUAL CONDITIONS ENCOUNTERED DURING THE GREAT INFLUX OF PATIENTS FROM THE MEUSE-ARGONNE OFFENSIVE.

This time is chosen, as it was the greatest and most comprehensive effort of the United States to turn the tide of battle and as a consequence was fraught with great casualties, but was worth the price, as it was this drive that definitely overcame the military superiority of the Germans and caused them to lay down their arms.

Train loads of sick and wounded arrived with such frequency that the capacity of the center was soon taxed to its utmost, all available bed space being occupied. The character of the cases was rather curious. One would naturally suppose that those suffering with wounds would be in the preponderance while, as a matter of fact, the sick, shell shocked and gassed constituted about 50 per cent of the total, at least as far as our center was concerned. Of these the most interesting, laryngologically speaking, were those that had been gassed, not considering the very exceptional throat wound cases. These gas cases were placed on the medical side and treated by the internist with occasional examination and advice from the staff laryngologist. (It must be remembered that the laryngologist was detailed as a ward surgeon and had little opportunity to devote time to his specialty.)

The symptoms in these gassed patients depended upon the concentration of the gas and the length of time it was inhaled. Like the severe wounds of the throat, those badly gassed were sent to hospitals near the front so as to avoid any transportation that was not absolutely necessary. As a consequence, we received only those cases that could be called moderate. On admission these patients were usually ambulatory, stating they had been exposed to the fumes of mustard gas, but did not appear to be suffering nor did they, as a rule, complain greatly. They were at once placed in bed and not permitted to smoke, although most of them had already desisted, as the tobacco seemed to have a peculiarly unpleasant taste. This was one of the earlier symptoms of gas poisoning.

After three or four days, the cough became more distressing and the laryngeal mucosa affected, which manifested itself by various degrees of hoarseness to complete aphonia. While, of course, this was due to the direct irritation of the gas, nevertheless, in my experience the psychologic element entered largely into the aphonia. Inspection at this stage revealed an intense hyperemia of the faucial structures which extended down into the larynx, the cords being red, thickened and relaxed. The parts were exquisitely sensitive and were difficult to cocainize, making the examination more or less tedious. Local treatment seemed to have little influence on the affection, and in five or six weeks it had usually ameliorated to such an extent that the patient could be sent back to his organization.

The grave form of gas poisoning was a much more serious proposition. Only one case of this character came under my observation and in a German prisoner; a more distressing example of suffering I have never seen. The dyspnea was marked and accompanied by a persistent cough which continued during the night and was very difficult to control. Expectoration was scanty, thick and sometimes streaked with blood; the voice had completely disappeared.

It was difficult to make an inspection, partly on account of the condition of the patient but mostly on account of the lack of facilities where he was confined. It was, however, plain that the entire mucosa of the upper respiratory tract, with the exception of the nasal, was intensely inflamed, red, swollen and covered with a grayish, dirty exudate. The interlaryngeal structures (arytenoids, aryepiglottic folds and ventricular bands) were edematous as far as could be seen. This condition gradually improved until at the end of eight weeks the patient had recovered from the distressing symptoms, leaving a very sensitive respiratory tract with a persistent cough and hoarseness.

WOUNDS OF THE THROAT INVOLVING THE PHARYNX AND LARYNX.

These were exceedingly rare in the hospital centers at some distance from the line of battle, as most of the cases of this nature were classed as urgent and sent to hospitals situated in the immediate vicinity of where the injury was received. The actual number of cases in comparison to other injuries was small, due to the protection which the chin offered, and, in the event of being wounded, to the fatalities from injuries to the great vessels in the neck.

PHARYNX.

These were rare, but occasionally when a missile of low penetrating power entered the neck and happened to avoid the great vessels, it either wounded or found lodgment in the pharynx. When this occurred from a high explosive shell or shrapnel the injury was more or less extensive and correspondingly dangerous, due to the certainty of infection and to the probable extension to vital structures. Machine gun bullets, on the contrary, could cause a penetrating wound of the neck traversing the pharynx, followed by prompt healing and little discomfort to the patient. It was really astonishing the slight inconvenience that some of these through and through wounds of the neck caused, especially when their location was taken into consideration.

LARYNX.

Wounds involving the internal structure of the larynx were seldom seen, due in a large measure to the natural protection afforded by the chin, as well as the mobility of the larynx itself; moreover, it must be remembered such injuries, when received, were rarely confined to the larynx but frequently embraced the great vessels of the neck in their destructiveness with almost immediate fatal consequences. Such wounds if received from the front were apparently most frequently due to high explosives, while those from the side, shrapnel and machine gun and rifle fire. By far the most frequent appearing at the hospital were caused by machine gun bullets. The relative infrequency of any sort of wound involving the larynx can be judged by the reports of Guisez, who found 17 in 726, and Scheier 7 in 2,500.

Symptoms.—One of the earliest and most common symptoms of a throat wound involving the larynx is dyspnea. This is due to a number of causes, including (a) the missile acting as an obstructing foreign body; (b) obstruction from the injured structures; (c) paralysis of the laryngeal muscles, and (d) the appearance of edema. Hemorrhage is constant and frequently serious in character, due of course to the rich blood supply of the larynx and the numerous and important vessels in its immediate vicinity.

Treatment.—Almost every case of this character, sooner or later, required a tracheotomy. Indeed many more patients would undoubtedly have been saved his an early tracheotomy been performed. Should dyspnea not occur immediately after reception of the injury, the possibility of its appearing later is by no means precluded, and should be confidently anticipated. The swelling and edema played the most important rôle in this connection, and the patient should be closely watched on this account. Immediate and secondary hemorrhage caused serious concern on account of its peculiar fatality. In many instances, the cartilaginous portions of the larynx were so shattered that it was difficult to find the bleeding points; these were the type of cases in which secondary hemorrhage so often occurred.

After the first phase of the treatment is completed—that is, when danger to life has passed and it is assured that the patient will survive, the attention should be directed to the conservation of the laryngeal tissues. The objects of this are to prevent subsequent stenosis, to preserve as much of the voice as possible and for cosmetic effects. This is accomplished by plastic resections and is largely in the province of general surgery.

NONSURGICAL AFFECTIONS OF THE PHARYNX AND LARYNX PECULIAR TO WAR CONDITIONS.

Excluding those conditions produced by the irritating gases (chlorin, mustard and sneezing), it cannot be properly said that any conditions peculiarly incident to war conditions were observed. The various commoner affections, such as coryza, sore throat, etc., were present as in civil life, but as the men became inured to life in the open they were much less frequently met with. There is no question that the men complained much less of nose and throat conditions than they did in the camps and cantonments in the States. The care and attention that these men received at home from the specialists before they were sent abroad was, without a doubt, responsible for this happy state of affairs, and I am proud to state that the results of the throat surgery practiced upon these men were almost unexceptionally without reproach.

THE EPIDEMIC OF INFLUENZA IN RELATION TO THE NOSE AND THROAT.

Everyone recalls the marked predilection for the respiratory tract shown by the causative factor of the influenza during the late epidemic and with what intensity and rapidity the pulmonary structures were involved. One would naturally suppose that the upper respiratory tract, particularly the nasal sinuses, would be shared in the involvement, at least in a more or less attenuated form. Previous epidemics have always been followed by a certain amount of sinus disease, therefore, everyone was on the lookout for the first symptom of this complication, and being particularly interested I was especially alert. I can now state that among the many hundred cases which I personally saw, not one gave the slightest symptom pointing towards the nasal sinuses. On inquiry among the other hospitals I found the same condition prevailing.

Acute angina was also the exception rather than the rule, even among those who contracted pneumonia. The larynx and trachea were not involved in the ordinary cases and seldom among the pneumonics. This was substantiated not only by laryngoscopic examinations but in the cases that ended fatally by autopsy.

As a résumé, it can be said that the great epidemic of influenza, at least in Southern France, showed very little predilection for the mucosa of the upper respiratory tract.

XXXIX.

MILITARY SERVICE*

OF

MAJOR HENRY LEWIS WAGNER, M. C., U. S. A.,

SAN FRANCISCO.

December 22, 1909, commissioned First Lieutenant, M. R. C., U. S. A.; inactive list.

June, 1916, Student Training Camp for Medical Reserve Officers at Fort Winfield Scott.

July 1, 1916, transferred to active service, First Lieutenant, M. R. C., U. S. A. Duty assigned: Chief of the Eye, Ear, Nose and Throat Service at the Letterman General Hospital, Presidio, San Francisco, from July, 1916, until December, 1918.

Promotion: Major, M. R. C., U. S. A., July, 1917.

Subsequent assignment to duty September 26, 1918. Commanding Officer Letterman General Hospital, Presidio, San Francisco.

Honorably discharged, December 5, 1918.

Medical report of the Nose and Throat Department Letterman General Hospital, Presidio, San Francisco, from July, 1916, until December, 1918:

Peritonsillar abscess, in large numbers quickly eradicated under local anesthesia, by usual incision with counter opening into supratonsillar space for proper drainage.

Tonsillectomies and adenectomies, in large numbers, under local anesthesia, with additional pituitrin. Small children under gas and ether. Few severe hemorrhages but no deaths. Preliminary blood and urine analysis if deemd necessary.

Bacillus fusiform with Vincent's spirochete, infection in mouth and throat in fairly large numbers, were comparatively quickly eradicated by curettement and application of tincture of iodin and general treatment.

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Arthritis of larynx, especially of cricoarytenoid joint, in a few older enlisted men, verified by repeated radiograms, did not offer any favorable prognosis.

Tongue lesions, excoriations and fissures due to sprue were only symptomatically benefited by lanolin and vaselin applications.

Calculi in submaxillary duct in several men with long Philipine service, simulating gastric and duodenal disturbances, were entirely relieved by the Wharton duct operation.

Chlorine gas poisoning cases, accidentally during time of training, producing edematous hyperemia in upper and lower respiratory tract, did well under chlorid of calcium internally and adrenalin locally applied.

Nasal leprosy, ulcerations in a civil employee from Alaska, showing pure culture of leprosy bacilli, transferred to leper colony.

Congenital nasal syphilis, in infants of enlisted men, stadium siccum and stadium secretionis, were most successfully treated by rectal hydrargyrum suppositories.

Operated sinus cases, after measles and scarlet fever, improved more readily under chlorid of calcium treatment.

Fracture of anterior frontal sinus wall and nasal bridge in aviator was corrected by intranasal operation.

Mosher's operation for draining lacrimal sac and nasal duct into the unciform fossa was found most practicable in comparison with other methods.

Convalescent cerebrospinal meningitis cases, showing labyrinth or retinal or optic nerve disturbances, manifested concomitant symptoms in the olfactory nerve tract.

Malingering among nose and throat patients was rarely observed. Instruction in personal nose and throat hygiene was given to all patients.

Daily sanitary inspection of our department wards, clinics and operating room produced a high degree of efficiency in our personnel.

XL.

MILITARY SERVICE*

OF

Major George B. Wood, M. C., U. S. A.,

Philadelphia.

My experience as an army otolaryngologist was attained entirely at Camp Meade. I reported for active service there on November 1, 1917, and there I stayed until my discharge on December 17, 1918. I was assigned for duty in connection with the Base Hospital, but was asked to be one of the board of special examiners and had charge of the examination of the ear, nose and throat of recruits. This latter work was done in the camp. The greater part of my duties, however, was connected with the Base Hospital.

At first there was absolutely no equipment, as when I arrived there the Base Hospital was far from completed, and only the framework of the building for surgery of the head started. In the latter days we had very excellent equipment in the ear, nose and throat clinic, in the operating room, and in the accommodations for ward patients.

The greater majority of the otolaryngologic staff were very excellent men. Almost all of them trained specialists and happily pleasant companions. Most of the staff who were there in the winter of 1918 were transferred to Base Hospital units for overseas duty, and at times the personnel became very much reduced. The proximity of the camp to Washington, however, may have been partly responsible for the comparatively short time when the nose, throat and ear work was handicapped by a lack of men, and towards the last we really had more men on the staff than we could keep busy.

We had a large outpatient dispensary which in the busy season required the services of two men for the greater part of the day. We had from one to three wards filled with nose, throat and ear cases, and the consultation work throughout the hospital kept one man pretty well occupied.

The operative work consisted chiefly of removing tonsils, submucous resections and mastoid operations. We did very little sinus work for chronic conditions, as it seemed to us much better to discharge a man with frank chronic sinusitis than to attempt any radical curative treatment. This applied also to the cases of chronic suppurative otitis media; only four or five radical operations being done during the time that I was there, and these mostly because of acute complications. After the spring of 1918 the commanding officer ruled that none except absolutely neecssary operations should be done. This cut out the greater part of our tonsil and septum work during the summer and fall of 1918. Minor operations, such as paracentesis of the ear drum, opening peritonsillar abscesses and incising furuncles of the external auditory canal were, of course, very numerous, especially during the winter months.

Most of our tonsil operations were done under ether; dissection and snare being the usual method of operating. The Sluder method was used for a while, but we had so much difficulty in controlling hemorrhages following this procedure that the method was given up.

We had considerable difficulty with acute tonsillitis following submucous resections, and occasionally other operations on the nose. Some investigation was carried out to determine, if possible, the cause of the frequency of tonsillitis in these cases. It was found that the presence of the hemolytic streptococci or other organism of an individual to be operated on. if said individual was in good health, had no effect upon the postoperative infection. On the other hand, if the patient soon after the operation came in contact with another patient suffering from acute tonsillitis or other acute infection, especially if the hemolytic streptococcus was present, tonsillitis developed in other 50 per cent of the cases, the disease beginning either on the fourth or fifth day after the operation. We were not bothered by any other type of postoperative infections.

Mastoiditis requiring operative interference was much more in evidence during the epidemics of acute infectious disease, especially measles. Our scarlet fever epidemics at Meade showed a very mild type. As a rule, our mastoid cases did very well, though in a few, secondary curettements or closures were necessary.

The terrible epidemic of influenza was characterized, as far as Camp Meade was concerned, by comparatively few complications of the ear, nose and throat. We had some 11,000 cases of influenza at Camp Meade, and out of this whole number only five developed mastoid infection sufficiently severe to demand operative interference.

There was a fairly large number of cases of slight otitis media; the majority recovered without even paracentesis. In the cases of otitis media which were sufficiently severe to call for opening of the drum there were usually hemorrhage blebs, both in the wall of the canal and on the drum. We did not see these peculiar subepithelial hematomas except during the influenza epidemic.

Epistaxis was very frequent in the influenza cases, so much so that the large majority of cases were not seen by a specialist; in fact, in only the severe cases were consultations asked for.

Sinusitis was fairly frequent, but usually recovered spontaneously in a day or so, though in one case in which orbital abscess was threatened, anterior ethmoidectomy was done. Laryngotrachitis was very common, though permanent destructive changes of the larynx were not seen. When the tracheal inflammation was severe, it was usually several weeks before the cough would clear up.

On the whole, the otolaryngologic work was interesting and instructive, though it was difficult at times to keep a smooth working organization because of the constant changes in the personnel, not only of the subordinate positions but also of the heads of departments. As a mild criticism, I personally believe that the various branches of medicine making up the surgery of the head unit should have been separate departments, and the head of each of these separate departments responsible directly to the Surgeon-in-Chief and not to an interposed head of Surgery of the Head.

XLI.

MILITARY SERVICE*

OF

CAPTAIN J. GORDON WILSON, C. A., M. C.,

CHICAGO.

I went to England in August, 1916, and was assigned on temporary duty to the Eye and Ear Hospital in Folkstone, established by the Canadian Army Medical Corps, in charge of war injuries to the labyrinth. In December, 1916, I was sent to France to report on injuries to the ear from high explosive shells.

My report, abbreviated, was published in the *British Medical Journal,* March and April, 1917 (later expanded into papers printed in the *Transactions of the American Otological Society* and the *Harvey Lectures* of New York, 1917).

When America declared war, I returned to Chicago and from that time on served on the Medical Advisory Board.

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*Symposium on Military Service of the members of the American Laryngological Association.

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

The Granular Substances in the Cells of the Organ of Corti of the Guinea Pig.

NAKAMURA, N.

Kioto University Bulletin of Otolaryngol., 1918—XII.

The writer has found, in his experimental works on the labyrinth of guinea pigs, stained by the Marchi's method, many small black granular masses in the cells of the organ of Corti, and drew the following conclusion:

1. In the organ of Corti in the guinea pig, when treated by the Marchi's method after decalcification and before putting into alcohol, many small black spherical granules in certain places in the cells of the organ of Corti are recognized in addition to the well known fat granules in Hensen's cells.

2. These granular bodies have been found especially rich in the upper part of the hair cells, but there are also some in the rods and Deiter's cells.

3. If the labyrinth is well fixed in life, the granules do not appear, and it may be concluded, therefore, that they must be the result of some postmortem changes.

4. The bodies can only be found by the Marchi's method, and even then, if the material is too large, the stain will not penetrate the granules. When the fat granules in Hensen's cells are poorly stained, the granules in the upper part of the hair cells are not stained at all. They are not stained with the usual stains.

5. The presence of this granular substance is not influenced by the pathologic or normal condition of the cells; and hence may not have any physiologic significance.

T. Hoshino.

II.—NOSE.

The Anaphylaxis Produced by the Absorption of Foreign Proteins from the Nasal Cavity or from the External Auditory Meatus.

ISHIDA, N.

Kioto Univ. Bulletin of Otolaryngol., 1918—XII.

The author quotes detailed reports on anaphylaxis, and studies the possibility of producing anaphylaxis from the nasal mucous membrane or external auditory meatus. Up to the present time it is supposed that it may be produced, but there has been no definite proof concerning this.

To solve this question he uses, as the anaphylactogen, goat serum, egg albumen and bacterial protein. These he introduces in the nasal cavity or external auditory meatus of guinea pigs, during certain intervals of time.

He concludes with the following:

1. When an anaphylactogen is introduced into the nasal cavity or into the external auditory meatus, there results an anaphylactic reaction after a certain time. When the anaphylaxis is produced, through the external auditory meatus, however, the reaction is not so marked.

2. When goat serum is introduced in the nasal cavity, every day for three days there follows a slight anaphylaxis, but when introduced every day for four or five days there occurs a stronger anaphylaxis. If the serum is introduced four times in one day slight anaphylaxis is observed, while if it is applied five to six times in one day a strong reaction appears.

3. With the introduction of goat serum into the external auditory meatus, every 24 hours for five days there is again observed a slight anaphylaxis. If it is continued five to six days there occurs merely a more pronounced reaction.

Likewise, in introducing it into the external auditory meatus five to seven times in one day, a slight anaphylaxis will again follow, while if it is introduced eight or nine times in one day strong anaphylaxis will be noticed.

4. When goat serum was introduced into the nasal cavity of a guinea pig every day for four days, a slight anaphylaxis resulted after five or six days from the last application, while after seven days the reaction is still stronger.

If the nasal cavity is treated with goat serum five times in one day there occurs a slight anaphylaxis after six or seven days from the last introduction; and then a stronger reaction after eight days.

5. If goat serum is put into the external auditory meatus once every day for six days a slight anaphylaxis follows after seven or eight days from the time of the last treatment; but a somewhat stronger reaction follows after nine days.

If it is introduced eight times in one day, a slight anaphylaxis follows after eight or nine days; but a somewhat stronger reaction follows after ten days.

6. When a mixture composed of bacterial protein 1 volume, leucocyte emulsion 1 volume, and extract of leucocytes 1 volume, is introduced into the nasal cavity no anaphylaxis follows. If a mixture composed of bacterial protein and extract of leucocyte is introduced, however, a weak anaphylaxis is sometimes observed.

7. When the same mixture is introduced as an anaphylactogen into the external auditory meatus, no anaphylactic reaction follows. If a mixture composed of bacterial protein and extract of leucocyte is introduced, however, a slight anaphylaxis is sometimes observed. T. Hoshino.

Treatment of Malignant Tumors of the Antrum.

New, G. B.

J. Am. M. Ass., Chicago, LXXVII—1296, 1300.

The usual treatment of malignant tumors of the antrum has been the resection of the upper jaw. The results have been operative mortality, very frequent early recurrences, and a small percentage of cures. By the use of the cautery and radium in the treatment of these conditions, two advances have been accomplished: First, the elimination of an operative mortality, and second, a marked decrease in the percentage of cases showing recurrences. The number of cures in the treatment of these patients by this method cannot yet be determined, but the present results are very encouraging. The cautery has been employed in the treatmnt of malignant tumors for many years. At the Mayo Clinic for the last three years malignant tumors of the antrum have been treated by the use of heat in the form of a soldering iron followed by radium treatment, and the immediate results are much better than when resection of the jaw was performed.

These have been followed by no operative mortality and no postoperative chest complications. Two of the patients lost the eye on the side involved from the reaction from the cautery and radium, but in both cases the floor of the antrum was involved. Of the eighteen patients with malignant tumors of the antrum who were treated, three are dead, two have extensive recurrences, and ten are well and have had no recurrences over a period of from eight to twenty-eight months. In seven of these ten cases there have been no recurrences after more than one year. In three cases data regarding the present condition of the patient were not obtained. The ten patients who are well cannot yet be considered cured, but their cases should be classified as having been without recurrences for a period of months or years. The results of the treatment of malignant tumors of the antrum, by the use of the cautery and radium, seem to indicate that the operative mortality that usually accompanies the surgical treatment of these conditions has been eliminated, and the immediate results have been improved markedly.

Emil Mayer.

Focal Infections of the Head as Sources of Systemic Diseases.

KING, JAMES JOSEPH.

Med. Rec., N. Y., 1920—XCVII—355.

Conclusions:

1. During the last ten years over fifty writers have presented scientific proof of the relationship of focal infections to systemic disease. This, in addition to the voluminous clinical evidence, has established beyond a reasonable doubt the etiologic relation of primary foci of infection to systemic disease.

2. In order to cure patients, the primary focus or foci must be found and eradicated, practically ignoring which one is the instigator. With our broader conception, we endeavor to look over the whole body and correct what is obviously pathologic. A certain amount of enthusiasm and generalship in the cooperation of different specialists is essential. The focus is

dealt with according to its location, by methods well known to all of us.

3. The new developments in this field are: (a) The broad application of this principle, now accepted by all progressive medical men. (b) The proof of stomach and intestines becoming infected by deglutitions of infected secretions from tonsils, sinuses and teeth. (c) The relation of primary foci in the tonsils to the mortality rate in such acute infections as measles, scarlet fever, pneumonia and influenza. (d) Its field of application is unlimited. We are just beginning to appreciate its value. Emil Mayer.

An Improvement of the Incision of the Lateral Nasal Wall in the Radical Operation for Chronic Maxillary Sinusitis.

KOIDE, G.

Kioto Univ. Bulletin of Otolaryngol., 1918—XII.

The writer reports an improved modification of Watsuji's operation. Prof. Watsuji independently designed a similar radical operation in maxillary sinusitis (May, 1905. Tokio Iji Shinshi) to the one Denker published in the same year. The writer first quotes the history of the operations in this affection and then shortly reviews Watsuji's operation.

In Watsuji's operation an incision about 3 cm. long is made in the labial mucous membrane just lateral to the frenulum in a transverse direction parallel to the line of attachment of the mucous membrane to the alveolar process. After denuding the mucoperiosteum, the anterior wall of the sinus is exposed. Then the mucoperiosteum of the lateral wall of the nasal cavity, from the edge of the apertura piriformis in the space between the line of attachment of the inferior conchæ and the floor of the inferior nasal meatus, is denuded.

The bone of the anterior wall of the sinus is removed, beginning from the edge of the aperatura piriformis to the extent of 1 to 1.5 cm. This window gives an inside view of the sinus, and next the lateral nasal bone wall is removed to a depth of 1 cm. and 3.5 to 4 cm. anteroposteriorly on the average Japanese adult. Care is always taken so that the lower edge of the bone is on the same level with the floor of the inferior meatus. The previously denuded mucoperiosteum of the lateral nasal wall is excised in a long quadrangular piece corresponding to the opening in the bone. The lining of the sinus is then curetted thoroughly and the cavity packed with iodoform gauze. The lip is then sutured and the operation is finished.

The difference between this and Denker's operation is chiefly in two points: First, it diminishes the facial opening, which has the advantage of lessening the degree of the anesthesia of the teeth after operation; and second, it does not interfere with or even touch the inferior turbinate, which is physiologically of importance.

The writer's method is to make the fenestra in the anterior wall first, but when he chisels away the lateral nasal wall he makes the upper edge of bone correspond exactly to the line of attachment of the inferior turbinate. When he has gone backward on this line for 3.5 to 4 cm., he cuts the bone away down to the level of the floor of the inferior meatus. This operation gives the same opening in the anterior wall at the edge of the apertura piriformis as is done in the Watsuji's method, but the quadrangular fenestra has an irregular upper edge, the maximum height being 2 to 2.5 cm., while at the posterior edge the opening is 1 to 1.5 cm. This increased width of opening aids in preventing the closure from granulation tissue after operation. T. Hoshino.

III.—PHARYNX AND MOUTH.

Tetany in the Case of Sprue.

BARUCH, A. L., AND MURRAY, H. A.

J. Am. M. Ass., Chicago, 1920—LXXIV—787.

A diminished concentration of calcium in the blood has been shown to produce tetany, and in the case under discussion the lack of this element was demonstrated by analysis of the blood. As bearing on the question of the cause of the disturbance of calcium metabolism in this particular individual, the following points are emphasized:

According to von Noorden, calcium is absorbed in the upper part of the intestine, combined with phosphoric and carbonic acids, but more especially with fatty acids in the form of soaps. Sprue patients, however, and many stool examinations proved it in this case, cannot readily digest fats. Is it not conceivable, then, that calcium was carried on with the fats, and that its absorption through the diseased intestinal mucosa was insufficient to maintain the proper balance? This is mentioned as a possible predisposing factor.

Calcium is mostly excreted into the large bowel; and in the present instance, owing to the prolonged intestinal irritation lasting over six or more years, the excretory rate of the substance by this outlet may have been abnormally increased. Such abnormal elimination would have tended to disturb still further the calcium equilibrium.

That the condition of the blood was an important factor is suggested by the rise in calcium following the transfusion of normal blood. We consider some of these points suggestive, but not conclusive enough to form any hypothesis for explaining the course of events which led up to the state of tetany. Emil Mayer.

Clinical Indications for Enucleation of the Faucial Tonsil.

QUACKENBOS, MAXWELL.
Med. Rec., N. Y., 1920—XCVII—654.

The absolute indication for enucleation of the tonsil may be defined regionally. There are four local conditions that indicate enucleation: (1) New growth, (2) the tonsillotomy operation, (3) recurring acute inflammation, (4) hypertrophy associated with eustachian or nasal obstruction. To these may be added the persistent diphtheria carrier.

Three reflex conditions warrant enucleation, particularly if upon inspection faucial hypertrophy is present: (1) Cough due to an enlarged lingual tag, (2) nocturnal enuresis in the absence of acid concentrated urine, (3) petit mal, or meningism.

The dangers and complications are slight. Two children developed bronchopneumonia, and two with chronic discharging ears required a mastoid operation a few days later. Five adults developed unilateral acute otitis media, and in three of them incision of the drum was required.

There were two deaths. One unfortunately from an overdose of chloroform (!); the other patient was operated upon for acute mastoiditis superimposed upon chronic otorrhea of many years' duration, and upon the third day showed intracranial pressure symptoms, without localizing signs; postmortem examination revealed a cerebellar ascess.

Emil Mayer.

The Cause of Abscess of the Lung After Tonsillectomy.

CLENDENING, LOGAN.

J. Am. Med. Ass., Chicago—LXXIV—942.

1. Lung abscess is at present a frequent sequel to tonsillectomy.
2. It occurs in all classes of cases—in private as well as in free services.
3. It is sometimes fatal, always serious and often very crippling.
4. It is due in some cases to inspiration of infected material.
5. Motor driven anesthesia apparatus, by creating a positive pressure in the pharynx, may operate as a cause. At any rate, the danger is sufficiently great to justify the discontinuance of their employment until comparative data can be secured.
6. It is due in some instances to metastatic infection through the lymphatics.
7. Swabbing or tampering with the throat after enucleation has been accomplished is the cause of one group of cases.

Emil Mayer.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Laryngeal Crisis With an Unusual Complication.

GREGORY, LOUIS T.

J. Am. Med. Ass., Chicago, 1920—LXXIV—793.

The case reported was apparently a syphilitic laryngeal paresis, corresponding to a gastric crisis, so frequently seen. It might have been an unusual type of diphtheritic paresis, but this is not likely, as there was no history of any diphtheritic process and no local evidence of diphtheria in an active form. Furthermore, it was a paresis, transient in type, and not a paralysis, as usually seen following diphtheria. Finally, the Wassermann reaction was strongly positive, with other evidence of syphilis as seen in the sluggish pupil, perforated septum, scars on the back and chest, and painful and roughened tibia, with a history of chronic sore throat and nocturnal pains in the lower extremities. The immediate response to antisyphilitic treatment confirms the diagnosis. As the left recurrent laryngeal nerve hooks around the arch of the aorta, one interesting possible explanation of the paroxysm is that a beginning syphilitic aoritis at this point caused an irritation to that nerve. Emil Mayer.

V.—MISCELLANEOUS.

Acute Respiratory Disease Carriers.

SPOONER, LESLEY H.

J. Am. Med. Ass., Chicago, 1920—LXXIV—584.

Conclusions:

1. The chronic healthy diphtheria carrier is very rare.
2. Although the sterilization of his mucous membrane is difficult, it is easier than that of the chronic disease carrier.
3. He and his fellow, suffering from the early stages of acute infection, are the potent factors in the spread of this disease.

Acute respiratory disease is at present the greatest menace to the youth of our country.

It is more serious in the army than in civil life.

The transient healthy carrier is more common than should be expected from the incidence of the specific disease.

The transient quality is shown by the disappearance of the organism without treatment.

The chronic healthy carrier is rare, except in the case of the "saprophytic pneumococcus" of Cole, in which many of the organisms may be nonpathogenic, and with streptococcus hemolyticus, in which a similar condition may well exist.

The potent factors in the spread of these diseases rest in this small group of chronic healthy carriers and the disease carrier.

The latter, during the prodromal stages of disease and convalescence, is of by far the greatest importance.

They respond to attempts at disinfection even less satisfactorily than do the chronic healthy carriers.

Emil Mayer.

SOCIETY PROCEEDINGS.

THE NEW YORK OTOLOGICAL SOCIETY.

Meeting of May 27, 1919.

DR. T. J. HARRIS, PRESIDING.

Atypical Mastoiditis.

DR. W. C. PHILLIPS: I want to speak in a general way of the prevalence during the past season of what we ordinarily call atypical cases of mastoiditis, in which there are but few classical mastoid symptoms. Many of them have little or no discharge; little or no pain; little or no temperature; but finally the few symptoms verified by the radiograph lead one to operate and very extensive involvement is found in the mastoid process.

I recall a private case in consultation with Dr. Friesner, which eventually required a double mastoid and in which extensive disease was found.

Another case somewhat different was a woman forty years of age, who complained of no pain in the ear, very little discharge, no mastoid symptoms, but enough redness of the drum and bulging apparent to lead me to believe that it was not a case of catarrhal involvement. I opened the ear drum, and she had some discharge for two or three days, but always complained of a sense of fullness on the side of the head. The discharge entirely ceased, and for about a period of over a week there was no discharge. She went back to her work and was apparently well, when suddenly she had a little bit more pain, and then a very profuse discharge of pus, and some temperature, but no tenderness of the mastoid. The discharge remained excessive, she had gone over a period of three weeks, and she was running a temperature of about 100 in the afternoon. I operated on her last week, and I have never seen a more extensively involved mastoid process. And yet that woman never had any pain; she never had a temperature above 100, and for the first three weeks of her disease, some of the time no discharge, and almost none until the last few days.

DR. A. B. DUEL: As far as my two interesting cases go, one was a double mastoid and the other a single mastoid, with a very slight middle ear involvement. In one case I myself was called in, and in the other case another physician was called in, and in neither was there sufficient involvement of the ear to warrant opening of the drum. There was a slight redness, and a slight pain, which subsided immediately; and after three or four days, another attack of pain, and at that time an involvement of the middle ear. In all of those ears the symptoms advanced so rapidly, and the discharge was so profuse following the opening of the middle ear that it seemed a wise thing to open the mastoid.

In all three of those mastoids the involvement was just as extensive as in Dr. Phillips' cases. In one, both sinuses were uncovered. Now, it seemed impossible for me to account for this condition, except by the idea that the infection had passed across the middle ear without very serious involvement, and involved the mastoid cells; that the inflammation had gone on there for a number of days—in one case for a week or so, from the very beginning—and that after the mastoid had become completely involved, it passed back into the middle ear, and passed out of the drum and had to be opened. Of course, it seemed absolutely impossible that such an extensive involvement could possibly have happened in a very short time following the acute middle ear symptoms.

CHAIRMAN: What was the organism in your case?

DR. DUEL: It was streptococcus.

DR. S. MCCULLAGH: I saw this young man about three weeks to a month after he had had an acute infection of his left ear for which a myringotomy was performed in an army hospital. There was a discharge for two or three days, and complete healing ensued. He came to see me for an acute catarrhal condition of his right ear, which cleared up under local treatment. He had very large tonsils, and a mass of adenoids, which I removed.

About nine days after the operation he had an acute suppurative attack in his left ear, for which I did a paracentesis.

The temperature at that time had been up to about 103; it went up to 105 2/5. Blood culture showed that the blood was swarming, literally swarming, with hemolytic streptococci. The ear was draining very well, and there were no symptoms, nothing in the ear picture that did not seem to be progressing favorably. There was no tenderness, no spontaneous pain, but the temperature was irregular. Dr. Friesner saw the case with me, and it was a question of whether the septicemia was secondary to the tonsillar operation.

The tonsillar cavity on the left side did not look well, and there seemed to be a slight amount of tenderness over the left jugular, with some involvement of the glands there. The boy was very sick, and it was decided that something must be done immediately. I think Dr. Friesner felt that the bacteremia was undoubtedly secondary to the tonsil operation as did I. I did not think that it could come from the ear, but at the operation I decided to go in through the mastoid on that side. This was six to seven weeks after his original infection. On opening the mastoid all the cells were full of granulation tissue. In the region of the bulb the inner plate was entirely destroyed, and there was an area about half an inch in diameter with a thick pad of granulation tissue on it. The sinus was plugged off, the jugular was tied and a portion of it resected. The sinus was opened, the wall of the sinus was not removed, the wound packed and the patient was put back to bed.

Inside of forty-eight hours his temperature reached normal, and continued normal and his recovery has been uninterrupted.

It was merely because of the slightly greater amount of tenderness over the left side, and the enlargement of the glands that made us go in on the left side originally.

Undoubtedly, this condition corresponds closely to the one that Dr. Duel referred to, in which there had been infection involving the mastoid, where the middle ear cleared up, and the destructive process had continued in the mastoid without any symptoms whatever. I had looked, of course, at his left ear when he came in complaining of his right ear, and the drum was practically normal at that time.

DR. I. FRIESNER: Surely atypical cases of mastoiditis have been more common this year than I have ever seen them before. I saw, during the months of January and February, four cases of perisinus abscess, in which there never had been any discharge from the middle ear. These cases began as very mild cases of otitis. No myringotomy was done, and the cases went on; all four of them had pain over the side of the head, and when I examined them the drums were not normal. They were thick, and in one or two of them there was distinct sinking of the posterosuperior wall.

There were three other cases that I saw during that time, or shortly after that time in the clinic, with precisely similar conditions; that is, there never had been any discharge from the middle ear; there had been an acute otitis of a mild character, followed by an intense hemicrania. After a little while they came to the clinic complaining of this pain over the side of the head, giving the history of a mild, acute otitis, four, six or eight weeks before; the tenderness was far back on the mastoid, in the region of the emissary, and the drum looked thick.

It seems to me that there must have been something peculiar about the infections this year if in an operative service as limited as mine I should have seen seven of those cases within so short a time.

As to Dr. McCullagh's case, I thought that the pyemia was a direct extension into the jugular from the pharyngeal veins, and we felt we had only one chance—that was to say, we must select into which vein this infection was entering. There was some difference in the two sides; the left side was brawny, somewhat brawny, and the glands were more numerous on that side than those on the right side. It was rather a surprise to me to see the findings in the mastoid. There was no pus, but the mucosa in the cells was very much swollen, and the horizontal portion of the sinus was covered with diseased bone; and on the dura, that is, on the outer covering of the sinus, there was a distinct diseased patch. The vein in the neck was perfectly normal. In other words, there were far more pathologic changes in the lateral sinus than there were in the jugular.

DR. W. C. PHILLIPS: I think this type of case calls for fine judgment. Yet every case has proven the diagnosis to be right.

DR. WELLS P. EAGLETON presented

A Case of Laryngitis With Unusual History and Most Unusual Pathologic Findings.

DR. WELLS P. EAGLETON: Almost all of us think that all this talk about tonsils and cleaning the teeth, etc., is a good deal of nonsense, but the postmortem presented made me believe that we can't avoid recognizing that if you are careful to look for chronic infections it can cause changes. And it is our business, if we see a diseased tonsil or bad teeth, to recommend their removal immediately.

Now, in this case, the thing that had made this man stay off was that he had always had headaches, never anything worse. But, in reality, he had a chronic infection that was producing a fibrosis in the vessels of his brain. It could have been prevented, if he had been operated on for some fibrosis infection perhaps thirty years before.

Also, another thing is the importance of infection on weak conditions. While I was down in Baltimore, talking to Weed, he told me a remarkable thing. They had found that by taking an animal and injecting it with Friedlander's bacillus they gave it septicopyemia. If they did a lumbar puncture the spinal fluid was clear, but by doing the lumbar puncture they gave it a meningitis. They repeated it over and over again, and in Weed's mind there is no doubt that in certain forms of septicopyemia, if they give him a lumbar puncture, they will give him a meningitis.

The first time the test is clear, but the second time it shows an infection of meningitis. Now, one who is subject to a chronic poison is more apt to have a secondary meningitis. Why should this man suddenly have flared up if he hadn't it? In other words, he would have gotten away with the disease if he hadn't had this chronic infection.

DR. J. R. PAGE asked Dr. Eagleton if the spinal fluid was very straw colored in intracranial complications. He happened to have seen it in a case of a brain abscess, in which the spinal fluid was like urine. No bacteria could be found on smear or culture.

DR. F. J. BLODGETT: My case is a young lady, 21 years old, who has measles. The third day of the measles her right ear pained her and I incised it. There were no signs of inflammation in the left ear. That was at two o'clock in the afternoon. At nine o'clock the same evening she had pain in the left ear and I incised it the next morning. Her temperature went along well for a day or so, and then it went up to 102, with the onset of bronchitis. It was only a mild sort of bronchitis, and yet the temperature was running from 102 to 103 right along. At the present time, eight days after the attack, general condition is good, temperature 102 to 103, no headache, and yet I am in fear of the development of some serious complication.

DR. I. FRIESNER: I was very much interested in the work that was done in Baltimore. I have tried to correlate that work with some of our clinical findings, and it occurred to me that all of us have seen repeatedly atypical cases of sinus thrombosis in which there has been, for instance, a sustained high temperature with headache, where we were in doubt as to whether we were dealing with a meningitis or not, and where simultâneously we had a blood culture, blood count and a lumbar puncture done. Now, I am sure that not one of you will recall a case in which, despite the fact that a positive blood culture was found, meningitis ensued because of a lumbar puncture.

The work in Baltimore is very interesting. It was done on monkeys, wasn't it?

DR. EAGLETON: No, on a cat.

DR. FRIESNER: Cats are exceedingly prone to meningitis. Clinically, the fact that following lumbar puncture in the presence of a positive blood culture with sinus thrombosis, meningitis has never followed, so far as I know, leads me to doubt very much the value of this work so far as it applies to otology.

I would like to hear from Dr. Eagleton about that, because I feel sure that idea must have occurred to him, too.

DR. EAGLETON: I agree with all Dr. Friesner says. That has been my personal experience, but we have seen sinus thrombosis, when we did lumbar puncture, that did not develop into meningitis, but then we have seen sinus thrombosis cases, with the Friedlander infection, that did develop into meningitis. While they were doing this work, and after they had already prepared it, a man from one of the camps reported that he had made the same observation in the camp, not among cats, but among humans, and he said that it depends on the infection. If there is an epidemic of Friedlander's bacillus, as far as it is known now, a lumbar puncture results in meningitis. It is not so in the streptococcus septicemia.

DR. A. B. DUEL: It strikes me that Dr. Blodgett's case is a problem. It is a very fortunate thing when such a case happens to be in the institution where the X-rays may be used. If Dr. Blodgett had an X-ray apparatus right next to his patient, he could have a confirmatory report on his suspicions. But I can see perfectly well where a man might hesitate to operate on a case for a few days, without any further symptoms than he has.

DR. W. C. PHILLIPS: As I recall it, Dr. Blodgett stated that there was distinct mastoid tenderness at the tip.

DR. ROBERT LEWIS: I would be inclined to operate.

DR. PHILLIPS: I would venture to predict that any time within the last few days it would have shown disease of the mastoid.

THE CHAIRMAN: The Chair would like to ask if any of the gentlemen have had any experience outside of institutions on the X-ray outfit? I studied it pretty carefully at Oglethorpe. At first we were satisfied with it, but after a while we came to the conclusion that the pictures were misleading and we were not willing to venture an opinion on it.

DR. PHILLIPS: I think we all recognize that radiographs of the sinuses and the mastoid are good ones only when made by experts. I don't know, even in New York City, outside of three places where I could ever expect a good radiographic picture.

THE CHAIRMAN: I am speaking of the portable——

DR. PHILLIPS: I understand, but I doubt if any portable apparatus has been perfected.

DR. ROBERT LEWIS: I saw a case four days ago that has developed some alarming features. He had had a maxillary sinusitis a month or so past, and later developed an acute purulent otitis media. The drum membrane was opened three weeks ago. A week or ten days later the perforation was healed. There was no discharge. There was some slight deafness present. Two days before I saw him there developed a swelling underneath the tip of the mastoid process.

I was asked to see the patient and I found that the drum membrane was somewhat thickened. There was a little pink condition around Shrapnell's membrane; he had no mastoid tenderness; but there was this distinct swelling right below the tip of the mastoid process, and there was a general edema of the neck, extending to the median line. He had a temperature of 99° and a fraction. The man had not been well for some three months. The other aurist and myself believed he had a Bezold perforation. The radiograph showed the cells cloudy and the trabeculæ broken down. We operated on the next morning. The incision was extended down lower than usual and opened up this abscess, which did not lead into the mastoid process. The mastoid was opened, the cortex was exceedingly hard and, having penetrated the cortex, we found the underlying cells filled with granulation tissue and pus.

There was no great amount of pus. The bone was very much softened. The cells over the jugular bulb were very soft, as also those in the angle between the middle and posterior fossæ.

The operation was done before twelve o'clock. That night at midnight his temperature rose to 105° F. The next morning he had a cellulitis, extending well down along the anterior border of the sternocleidomastoid muscle; the temperature has remained high. The abscess cavity has been opened and followed down along the border of the muscle and as far as the sternoclavicular notch. I believe we have reached the end of the abscess cavity. He has areas of consolidation of both lungs. The temperature remains high—104° F. and more—the respirations are 48. The man is irrational to a certain extent, I suppose due to the high temperature.

I have never seen a case where the cellulitis developed so rapidly. I do not think the infection extends beneath the muscle, not that it has invaded the common sheath of the great vessels and the pneumogastric nerve. The infection is a streptococcus hemolyticus; the blood culture is negative. The blood count showed over 6,000,000 reds, 81 polymorphonuclear cells and 29,000 white cells. The infection is very marked, much pus, with a very foul looking wound.

The question is whether, if we had not operated, he would have developed a sigmoid sinus thrombosis, as the bone was very soft over the knee and required exposure of the sinus at this point to eliminate the necrotic bone.

The induration the following morning was very marked, very hard and very brawny, more than half way down the anterior border of the sternocleidomastoid muscle.

Dr. Wells P. Eagleton asked if it might have been gas bacillus infection?

Dr. Lewis: I do not believe so. The wound was very foul inside of less than twenty-four hours. We operated at one o'clock and the next morning at half past seven the edema and swelling was very marked and, when the neck wound was extended further along the anterior border of the sternocleidomastoid muscle, the area was found to be much infected, with much pus present.

Dr. McCullagh: Was the skin discolored at all in the neck over the wound?

Dr. Lewis: The next morning it was.

Dr. McCullagh: Was it red or dusky?

Dr. Lewis: Dusky.

Sinus Thrombosis.

Dr. A. B. Duel: In this case which I saw with Dr. Ward the mastoid operation had been performed, and in the course of a week following typical symptoms of septic sinus thrombosis developed, and it was decided to operate. The jugular vein was tied, the sinus was uncovered, and well back behind the knee, Galen's vein was uncovered. It was plugged off, the sinus opened, and a septic clot easily removed without great hammering. There was a very nasty vein wall all the way down, which was cut away and left as open as possible. The temperature dropped immediately to normal, and for nearly a week we felt that the case was recovering, when again typical symptoms of septic sinus thrombosis appeared.

We began put the child under an anesthetic, uncovered the sinus farther back toward the torcular, found that the vein wall had infected the clot; the clot was subsequently broken down and again delivered through the torcular end. On the second operation the sinus was plugged off probably not more than half an inch from the torcular, and all the clot removed. The temperature then dropped, and apparently the case was cured for nearly another week, when again the symptoms of septic sinus thrombosis appeared.

The third operation, which was considered a very desperate one brought up a grave question as to wether we should simply remove the septic clot and plug off at the torcular, or what could possibly be done to get to an area of the sinus wall which was still healthy? We felt if we used an ordinary plug, and still left a healthy vein wall, that we would possibly encroach on the torcular to the extent that we would produce a clot within the clot. So we decided to uncover the whole torcular so that we could see the outline of it, and try to plug it off without interfering with the circulation coming from the longitudinal sinus and from the other one. The question of how we would possibly do that with the smallest kind of a plug was discussed. So I said, "If we could take the smallest tube and carry it out with a little bulb around the end of that clot and push it down there, we still would have plugged off the torcular without having interfered with the other veins which come into it."

At the suggestion of Dr. Ward, I used the smallest rubber tube, inserted a silver director or probe and cut it off and slipped it under the bone at one end and under the bone at the other end and tied it off. Having removed our septic clot we got the whole thing out. We tried it two or three times; we lifted the thing and let it bleed two or three times, and finally we found we could control it perfectly. We left it there, and were fortunate enough to have the case well again in a short time. It is now about five or six weeks since that happened.

DR. LEWIS: How long did you leave the tube in?

DR. DUEL: It was left there for a week. It was removed under anesthetics; no pain.

As this little narrow rubber tube with the silver probe did it perfectly, I intend, if I do any more sinus cases, to plug the sinus with a small rubber tube, with a little silver wire in it, or something stiff of that kind, rather than to use gauze.

DR. T. P. BERENS: You mean compressing, not plugging, don't you? You compress your sinus, you stop the bleeding by compressing and not plugging.

DR. DUEL: Yes.

DR. BERENS: Crosswise?

DR. DUEL: Just as you always do, only when you do it you use gauze instead of this tube.

DR. BERENS: Which side was it on?

DR. DUEL: Left.

DR. J. G. DWYER: I saw this case of Dr. Duel's. The interesting part of it was the fact that he kept at it, with the blood picture suggesting sepsis all the way through. The child seemed to be gone day after day, but he had the nerve to go back to the torcular end and finally he just turned the tide. Everybody practically had given the child up.

DR. J. R. PAGE: Dr. Duel may recall my speaking to him of a similar case I had in Norwalk, Conn., which was operated on by me four times, the thrombus reformed four different times until the torcular was reached. I was surprised to hear it was on the left side—they seem usually to occur on the right, which is the larger sinus in about, I think, 70 per cent of cases, as it is a continuation of the larger longitudinal sinus in this percentage of cases, the left being a continuation of the smaller straight sinus.

In this case I got back to the torcular and put an iodoform gauze plug into the lumen of the vein, and I felt much disturbed for fear that I had interfered with the circulation on the opposite side. In looking up the literature, when reporting the case later, I found there had been an interesting discussion by Mr. Balance and Mr. Hugh Jones of the Liverpool Eye and Ear Infirmary on the subject. Mr. Jones maintained that enough attention had not been given to the extension of thrombi to the other side of the torcular—that is, to the danger of the thrombus at the torcular going across and involving the opposite side. Mr. Balance spoke, on the other hand, of the anatomic situation there as a safeguard against this very thing, as the right longitudinal sinus in about 70 per cent of the cases is a continuation of the longitudinal sinus, and the left a continuation of the straight sinus, with sometimes no communication between the two at all, and usually a communication across the front of the torcular in the shape of a short sinus. The confluence of the sinuses usually described in the textbooks that we had in school is the exception. That is about as exceptional almost as when there is no communication between the two, I believe.

The "sinuum confluens" is almost as exceptional as an entire separation of the two sides. There usually is either a small aperture, or a short sinus across the front of the torcular. I remember distinctly, after removing the clot at the torcular, there was a sudden gush of blood, which was promptly controlled when I stuck my index finger into the lumen of the vein. I could then feel an aperture of communication with the opposite side. Now, whether this was an aperture into the straight sinus, or into the small connecting sinus, I don't know, but I just took a piece of gauze and stuffed it in there, and the patient got well.

DR. CHAS. E. PERKINS: I have dissected this region in a considerable number of cadavers, and I have never seen the large dilatation or confluence of the sinuses, but I never saw a case in which there was not a communication between the two sides. As Dr. Page says, the right sinus is usually a continuation of the superior longitudinal.

DR. ROBERT LEWIS: I had a case, a young girl who had had a tubercular history. She developed a mastoiditis. Shortly after the operation she had chills and all the signs of a sigmoid sinus thrombosis. I removed the internal jugular vein and opened the sinus and found a clot in it. Her temperature, instead of going down as is usually the case, shot up very high. A few days later I reentered the wound and found a clot near the bulb, which I removed. But her temperature still kept up. The temperature remained of a septic type for a good many weeks—from 97 up to 106 degrees F., always preceded by a chill. She developed abscesses of both axillary glands. They were opened.

The blood culture showed 110 colonies in 15 cc. of blood. At the end of two weeks and a half we gave her transfusion of 800 cc. of blood. Her temperature went up immediately after transfusion, and kept up for some little time after that.

A week later we gave her a second transfusion, the temperature came down and she commenced to get well. She is now well and the wounds practically healed.

The history of the case ran over a period of four weeks. She also had some consolidation of the lungs.

THE CHAIRMAN: Do you ascribe the final recovery to the transfusion.

DR. LEWIS: I think so, although the first transfusion was not given until the temperature had fallen a little. And then there was a recurrence of the septic temperature. But following the second transfusion there was a decided change for the better.

DR. WELLS P. EAGLETON: What form of transfusion did you use?

DR. LEWIS: The syringe was used to transfer the blood from the donor to the patient.

THE CHAIRMAN: Dr. Page, have you something that you would like to bring up?

DR. J. R. PAGE: No, Mr. President.

DR. CHAS. E. PERKINS: Speaking of the gas bacillus infection of the mastoid, several years ago I had a patient who I thought at operation had that infection. It was a patient who died of meningitis. He had postauricular edema which had developed during the previous twenty-four hours. There was no crepitation, however, in the edema over the mastoid, but when I incised down to the bone there was a whistling escape of air—that is, an escape of air with a whistling sound. The very careful bacteriologic examination made by Dr. Dixon, both of the discharge from the mastoid wound and also from the brain later, however, failed to show any germs to which he could attribute that formation of gas. I have never been able to explain why that should have formed there, and I thought I would bring that matter up at some time and find out whether it was as unusual an occurrence as it seemed to me at the time.

CHAIRMAN: Have any of the gentlemen had any like experiences?

DR. J. G. DWYER: I have seen two cases of gas bacillus of the ear. One was a case of Dr. Carter's. I was just asking Dr. Perkins whether the typical gas bacillus had been identified in this case. We believe there are a whole lot of organisms belonging to the gas bacillus classification. There are a whole lot of cases reported of wounds during this war where the gas bacillus set up infection. The majority of these cases died.

Incidentally, the Welch bacillus exists without causing any infection whatever. It only seems that when it gets beyond balanec that it causes any trouble. The big question now is somehow to classify them.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of April 7, 1919.

THE PRESIDENT, DR. ELMER L. KENYON, IN THE CHAIR.

Froelich's Syndrome.

DR. GEORGE W. BOOT presented a boy aged twelve years who had a suppurating ear. The patient had been in the Cook County Hospital for treatment of measles. The boy was fat and pudgy and the fingers and toes were very short. He had the typical configuration of the female. No public or auxiliary hair. Dr. Boot suspected a mild case of Froehlich's syndrome. There was no enlargement of the sella turcica. The visual fields were narrowed. The patient passed 1,560 cc. of urine in twenty-four hours. A test for sugar tolerance had been requested but had not yet been made.

Dental Broach in Trachea.

DR. G. W. BOOT: The patient was a lieutenant in the Medical Department at Camp Custer, who had a foreign body in the trachea. A dentist in working on the teeth used a broach which slipped and went down the trachea. It was located by means of the X-ray examination, and it was very easy to do a bronchoscopy, which was finished in ten minutes. (X-ray plate was exhibited which showed the location of the foreign body in the right bronchus.)

DISCUSSION.

DR. J. HOLINGER said that all suppuration in the middle ear had stopped, but about once a week there was a temperature of 102° which lasted for about a day and then went down to normal. There was still a question as to whether there was sinus trouble and that was being investigated.

DR. NOAH SCHOOLMAN presented his thesis entitled

Contribution to the Etiology of Peritonsillar Abscess: Dental Origin.*

DISCUSSION.

DR. ROBERT SONNENSCHEIN said that he had seen a case in the last few months which illustrated many of the points described by Dr. Schoolman. A man of forty had trouble with his last lower molar, but despite the advice of the dentist the tooth was not extracted. The patient shortly afterward had sharp, severe pain together with the trismus described, with fever and a swelling pointing toward the angle of the jaw. There was great difficulty in opening the mouth, as there were no teeth missing, but by means of a long dressing forceps he was finally able to open it. An enormous amount of pus was evacuated and the abscess continued to drain for six or seven days, with eventual recovery.

DR. NORVAL H. PIERCE thought Dr. Schoolman had presented an important subject that had been very little talked or written about. He recalled cases where it was very difficult to make a differential diagnosis between paratonsillar and peritonsillar abscess, one particularly where the trismus was so great that little or no examination could be made. The abscess finally broke and the diagnosis was made after the man was relieved. These cases might cause very grave conditions, even threatening life, for they might be accompanied by profound sepsis. A case following extraction of an impacted wisdom tooth seen at Michael Reese Hospital had such a severe trismus that the abscess could be reached only with great difficulty. In that case there was very profound sepsis, and even after evacuation of the pus there were symptoms which proved that streptococcic infection had been well distributed through the body. He thought the subject would be kept more prominently in mind than it had been in the past on account of this very timely paper.

The subject of trismus was very interesting. They often found it in France accompanying slight wounds of the muscles of mastication. For instance, a soldier might come into the

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*See page 59.

Head Hospital from some other base or evacuation hospital with a very small healed wound in the cheek, and yet the jaws would be so firmly locked that he was fed with difficulty. X-ray examination would disclose a small bit of projectile lodged in the masseter, perhaps only as large as the lead on the sharpened end of a lead pencil. Parenthetically, it was not always easy to remove these foreign bodies after the wound of entrance had healed. The proper way to remove them was to operate under the fluoroscope controlled by the trained observer, watching the foreign body, the operator being directed in his approach by the observer. The scar tissue in which the foreign body was encased was removed together with the foreign body. Some cases would relax somewhat under deep anesthesia but not all. He had seen the jaw relax immediately after removal of the foreign body so that two fingers could be inserted between the teeth, which before had been approximated firmly. The nature of the trismus was not by any means thoroughly understood and needed to be further investigated. Possibly an allergic factor was involved. It was suggested that trismus might be an important point in the differential diagnosis between the two kinds of abscesses under discussion.

Dr. Robert Good said, regarding the etiology of peritonsillar abscess, that some ten years ago he studied a few hundred tonsils with Dr. Orndoff, and in the examination they found many mucous glands in the capsule of the tonsil and found ducts leading from these mucous glands to the epithelium and then through the stomata between the cells into the tonsil crypts. Many of these mucous glands showed areas of degeneration. Some had fibrous tissue showing healed conditions of inflammation, and in others there was inflammation and degeneration of the glands themselves. It was clear to him that a peritonsillar abscess might be caused by a cryptic infection passing through the stratified epithelium of the crypts into these mucous ducts to the mucous glands, producing a pus infection in the latter, which ruptures and breaks through the capsule of the tonsil, forming a peritonsillar abscess. He was satisfied that this was one cause of peritonsillar abscess. This also explains why a peritonsillar abscess so frequently follows acute follicular tonsillitis.

Dr. H. L. Pollock said that several things occurred to him as he listened to this valuable paper. He asked if Dr. Schoolman had ever seen any of the cases in tonsillectomized patients. This was an important etiologic factor. They very often found bilateral peritonsillar abscesses which were known to be of tonsillar origin. He had recently seen a case in which the dentist had been manipulating the last lower tooth on the left side. The patient was a man of forty-five and he had been treating him for several days. Trismus was so intense that he could not make a satisfactory examination but he made a diagnosis of peritonsillar abscess. The patient was sent to the hospital for X-ray examination and possibly an anesthetic to see if he could not be relaxed. In the afternoon the abscess broke and the man could open his mouth so that an examination could be made. There was no question about its being a peritonsillar abscess of dental origin. The most important feature of the case was the great amount of trismus. The diagnosis had to be made almost entirely by exclusion; this was very difficult and in some cases one had to go in blindly. He knew in this case that an abscess was present because of the temperature and swelling. He always did as Dr. Sonnenschein did—took a blunt forceps and opened the abscess, and it was remarkable to see how quickly the trismus disappeared. He had found, however, that these cases took a much longer time to disappear and heal than the ordinary tonsillar abscess. In two cases the pus escaped for a long time before the abscess healed sufficiently for the molar to be extracted.

Dr. A. A. Hayden stated that some years ago he officed with a dentist who made a specialty of teeth extraction. Cases were frequently referred to him in which a difficult extraction had been performed—such as the removal of impacted molars—with the patient complaining of sore throat and inability to open the mouth, at least not without a considerable amount of pain. He had only seen one peritonsillar abscess among these cases, but supposed that that one quinsy case was of dental origin. He thought that trismus was one of the earliest signs of peritonsillar abscess. A history of sore throat, inability to open the mouth except with increased pain, were almost pathognomonic symptoms of peritonsillar abscess.

Small abscesses were often hard to locate, and frequently were not opened as early as they should be. Occasionally an unsuccessful attempt was made to open them, pus was not found and the patient was not relieved. When pus was found and evacuated the trismus very rapidly disappeared.

DR. HARRY KAHN said that about two months ago he was called upon to recommend a surgeon for a possible case of lockjaw. During two weeks the jaws gradually became more and more locked, and when he was called in the patient could not open the mouth at all. On examination there was the trismus, temperature of 101° F., pulse 118 and the patient was in a profuse sweat. The mouth was almost totally closed and could be opened only enough to get in one of the Pierce tongue depressors. There was presented a bulging area over the left tonsillar fossa and well up on the hard palate. He thought the best plan was to make an incision, and the pus spurted out under great pressure. The trismus, however, persisted for almost ten days before the mouth could be opened widely. He believed that a piece of tonsil had been left, as the history had stated that the tonsil had been removed, but this was not the case; back in the jaw, however, they discovered a decayed molar. The remarkable thing about the case was the trismus, which came on slowly and remained for so long.

DR. ARTHUR M. CORWIN said that there were probably none present who had not seen inflammatory conditions in that part of the mouth, with or without abscess, and yet producing trismus. He had seen a number of such cases, for example, where the teeth had been extracted and a very great disturbance was set up as a result of digging into the bone, and the inflammation of the masseter muscle gave the very picture so well described by Dr. Schoolman. They had also seen peritonsillar abscesses not of dental origin which had produced trismus. He had seen extensive overlapping of the gum in the region of the last molar, with the tooth submerged, the part infected, with pus running out from behind it, and a large inflammatory area extending up the anterior pillar, extending to the side of the masseter and producing more or less trismus without localized abscess outside of the inflamed area around the tooth.

He thought the paper was excellent and showed much study and thought, but he wondered whether we should draw the differentiation too sharply as between the two terms, para- and peritonsillar. Personally he had preferred the word "paratonsillar," as it covered all sorts of conditions, whether localized to one small area or extending upward or downward, sometimes to the lower third, and pointing usually toward the front. It always seemed to him that they were "para"—near, not "peri"—around. He thought Dr. Schoolman would limit the term "para" to other abscesses notably of dental origin which did not involve the space between the tonsil and the constrictor, and yet trismus being a very definite symptom. To him it was simply a matter of degree of extension and involvement. It was not worth while to take issue with Dr. Schoolman, as both terms would cover abscesses near the tonsil.

Dr. Norval Pierce said that two of the speakers made him think he had not made himself clear regarding the extreme trismus in these cases. He meant that the extreme trismus which came on early in paratonsillar inflammation might be a very valuable differential point between para and peritonsillar abscesses.

Dr. J. Holinger agreed with the other speakers that the paper was timely. It drew attention to an etiologic factor of peritonsillar abscess that possibly had been overlooked, but it is certainly not the exclusive etiology.

In treating this condition for several years, it had been his habit in peritonsillar abscess to advise general anesthesia and remove both tonsils. In doing this he often found that the tonsil was practically dissected by the abscess. The abscess spread in the capsule of the tonsil, and the moment he loosened the tonsil from the anterior and posterior pillars it was comparatively easy to roll it out into the mouth and snare off the base. A patient who had been septic for days would be found free the next morning. Another advantage is this: Quite often peritonsillar abscesses had to be incised from three to five times. As soon as one abscess was evacuated another formed next to the first, and it was often a question of several weeks before such a patient finally gets well. This is, of course, excluded after the tonsils are out. This proposition was not so startling if one remembered how often separate and unexpected abscesses were opened in simple tonsillectomy.

Dr. Arthur M. Corwin said that Dr. Holinger might not have had any serious complications in the removal of tonsils in the cases of quinsy or para- or peritonsillar abscesses, but in cases of such extent, tooth or otherwise, where the effects might bring serious issue, he doubted if it would be considered good practice among surgeons and medical men, and in this specialty, to take out the tonsils and open up such a large area to pus from the peritonsillar abscess.

Dr. J. Holinger, answering Dr. Corwin's objection to his method, thought that it was good surgical procedure wherever there was pus to open it up. It seemed to him that this would be a good plan to follow in peritonsillar abscess. For obvious reasons he would not use Sluder's method in these cases.

Dr. Alfred Lewy read a paper entitled

Operative Treatment of Chronic Suppurative Otitis Media.

The cases are divided into urgent and nonurgent. In the urgent class we put intracranial complications, including labyrinth and lateral sinus cases, general sepsis and acute exacerbations in general. In these cases the question is between watchful waiting and immediate operation. Operation sooner or later is indicated, but a good diagnosis is prerequisite to the decision as to the best time to operate. Diagnosis depends upon history, general examination, with special reference to facial expression, tongue, skin, bodily condition; examination of blood, urine, viscera and musculature, followed by neurologic, including fundus examination and Barany tests where applicable, study of pulse and temperature curve, and finally spinal puncture with cell count, chemical and bacteriologic investigation. Exploratory operation is justified for unlocated pus in the cranial cavity and when other diagnostic measures have been exhausted. The diagnosis takes time, and time is valuable, but error is fatal, and the percentage of recovery is certainly greater with the man who has his facts in hand and who knows when and how to operate.

In labyrinth complications, first determine if there is any hearing or response to static tests; during active symptoms absolute rest in quiet dark room. In the event of endocranial complication immediate radical and labyrinth operation if labyrinth is dead. In acute suppurative labyrinthitis either course, immediate operation or expectation treatment, is fraught with danger, but I believe the course herein advised is the less dangerous. After acute symptoms subside, radical operation, plus labyrinth operation if justified by tests and operative findings. A live labyrinth should not be operated. If active symptoms, recent or present at time of operation, the Neumann operation is preferred. In the case of a dead labyrinth that has been symptomless for a long time, the question of operation thereon can also be determined by the operative findings. When the disturbance is not violent and merely due to pus retention in middle ear spaces immediate operation may be done.

In acute exacerbations of chronic suppuration I favor careful observation until acute symptoms subside as the safer procedure. Endocranial complication demands immediate operation. Also subperiosteal abscess requires operation, but the plastic must be postponed.

In the nonurgent cases the following factors are considered:

(a) The probability of serious complications.

(b) The amount of disability or discomfort caused.

(c) The probability of cure by less radical measures. This includes economic conditions.

(d) The effect on hearing, which may be worse but not better.

Most nonurgent cases are amenable to cure or good control by local treatment; all should have the benefit of a trial course of treatment.

Indications for operation are: Cholesteatoma; caries of temporal bone; fistula of mastoid or bony canal; strictures; recurrent granulation tissue; adherent remains of membrana tympani or malleus, especially when associated with marginal perforation; frequent headache, vertigo, general ill health; persistently fetid suppuration resisting all treatment.

Probability of cure: Fifty per cent or less have dry ears after operation. About twenty per cent are mucous membrane cases; in these operation is needless and generally useless, except perhaps closure of tube.

Selection of type of operation: Ossiculectomy if necrotic process is confined to ossicles of aditus and attic, providing hearing is less than one meter for the voice. It has the advantage of local anesthesia and no period of disability. Contraindicated by labyrinthine or endocranial complications and not without danger to the facial nerve and labyrinth.

Modified radical: Heath's and Ballenger's modificaiton preserve the annulus tympanicus, and require elaborate after-treatment. Stacke, Bondy and Blackwell remove outer attic wall, but all aim to preserve the ossicular chain and remains of the membrana tympani. They had their place, but it is not well defined, except Stacke, who says his operation is useful when the perforation is in Schrapnell's or posterior superior margin and is closed off from the eustachian tube. He claims it is useful even if the incus is destroyed. Some type of modified radical is indicated when the simple mastoidectomy will not suffice and hearing is still fair, especially in children; when both ears are to be operated upon the better one may be selected for this operation; in the epitympanic type Stacke's operation may be done; however, according to our own technic.

For all other chronic suppurations which require operation the complete radical is done, having first tested the labyrinth and searched for evidence of endocranial involvement.

DISCUSSION.

Dr. H. L. Pollock said that he had been asked to read a paper on this subject and that Dr. Lewy was going to present the nonoperative cases. Everyone realized that this was of vast importance, and with such a large field it would be impossible to discuss the whole phase of it. The time had changed from very radical procedure of a few years ago to more conservative treatment. A number of years ago, whenever a patient presented himself with chronic running ears, very few questions were asked, but a radical mastoid operation was advised. Now very frequently it was found by conservative treatment cases could be cured and remain practically cured without surgical interference. In many chronic cases with symptoms of endocranial complications surgical interference was required, but not necessarily immediately. He believed by careful watching and waiting the patient had much better chances than by immediate operation. He had seen many cases of labyrinthine symptoms in acute exacerbations disappear by conservative treatment. He thought it was contrary to all surgical procedure to preach opening such an abscess in an acute condition. Nature had walled them off, and by going in fatal results were more likely to occur. The same thing held true with sinus thrombosis; it was not necessary to operate with the first chill, but let them go until sure of diagnosis and that the case was progressing rather than limiting itself. He believed there was very little question of interference where the diagnosis of extradural abscess and cerebellar abscess following the acute exacerbations, the main thing was to be sure of the diagnosis and then operate. He thought the most important point was in the nonurgent cases. It was pretty well agreed that where there were endocranial complications and in the chronic cases what was to be done. His rule was after careful examination to tell the patient with the fetid odor that there were three indications: First, and most important, was the prevention of the endocranial complications. Second, was to attempt to secure a cessation of the foul discharge or change it from the foul to a nonodorous discharge, and third, to conserve as much hearing as possible. As to the time for operation, these three points must be kept in mind. Dr. Lewy believed that fifty per cent would stop discharging, but Dr. Pollock thought this was too large a percentage, that not more than thirty-five to forty per cent, or two out of five, would be as many as would be found and kept that way. As to the hearing, he thought this was very little better. There might be temporary improvement immediately following the operation, but as the scar tissue began to get thick and hard the hearing began to get less and within a year no improvement was noticeable.

The discharge in cholesteatomatous cases was persistent; he believed that in not one in one hundred of these cases which were operated the mass would not form again and discharge. They did occasionally get well, but very seldom.

As to when to operate on a chronic discharging ear, he thought that before attempting to do a radical mastoid operation everything in the way of cleaning up the pharynx and nasopharynx was very important. Tonsils and adenoids should be removed, and this procedure alone in children who had had a discharging ear often caused the discharge to cease and the drum membrane to heal over. If any accessory sinus trouble existed this must be looked after. In cases where this had been done and the discharge persisted he believed in attempting a modified operation in a selected number of cases. If, specially in young children, there was bilateral complication it was almost criminal to do a double radical operation without attempting the modified operation, and where they were successful the hearing would improve.

He had reported several interesting cases where they had attempted a radical operation on one side and a modified operation on the other. Where they were sucecssful the patient had almost normal hearing in the side of the modified operation and very poor on the other. The large proportion would not get well, and there was still danger of the endocranial complication, but in young children and adults it was better to take the chance and watch the patient carefully rather than make deafmutes of them.

Besides clearing up the nasopharynx and other things there were other measures. In the cholesteatomas nothing would effect a cure, but in cases where central or peripheral perforations of the drum occurred there was a chance by careful cleansing of the ear and vaccine treatment, treating the middle ear through the eustachian tube, flushing out the ear with antiseptics, using antiseptic powders, drying the ear, etc., it was surprising how many cures could be obtained. They usually devoted from six to eight weeks to conservative treatment. If after eight weeks' time the patient had not made much progress they considered it useless and resorted to radical operation. After the radical operation they found a mucoid discharge every time the patient caught cold. They called it "the third nostril," and in a great many cases had been able to stop the discharge by closing the pharyngeal end of the eustachian tube. He had ceased trying to close the tympanic end of the eustachian tube. In one case they used trichloracetic acid, which closed it up very nicely, but the patient developed a facial paralysis, which cleared up after three or four weeks. He thought conservative treatment should be tried for a long enough time to see if improvement would not occur; if not, a radical operation should be done. The first thing was to prevent any endocranial complications; second, try to stop the discharge, and third, preserve as much hearing as possible.

DR. AUSTIN A. HAYDEN read a paper entitled

Hemophiliac Type Hemorrhage—Treatment by Transfusion.*

DISCUSSION.

DR. H. W. ABELMANN said that he had encountered many queer experiences and surprises in the use of the biologic test for blood incompatability. This test consisted in injecting diluted donor's blood into the vein of the patient.

Blood which was very incompatible or toxic could be recognized in a few seconds. Only a few drops of such blood would bring about a reaction in a very short time.

Not knowing beforehand just how toxic the blood was to begin with, the blood was diluted to reduce its toxicity. To further control any sharp reaction, the blood was injected a few drops at a time and repeated every few seconds. If no reaction followed after a lapse of from three to five minutes the blood was usable as far as its compatibility was concerned. This simple test had been a very important safeguard in blood transfusion work, as he had had no deaths or serious mishaps in nearly two thousand transfusions which he had performed in the last three and one-half years.

The item of special interest to him was admirably illustrated in Dr. Hayden's case, namely, that the donor's blood may contain the coagulating ability but may not transmit that ability or may not be of any benefit in stopping the bleeding when injected into the vein of the patient. In this case, the biologic test demonstrated the compatability of the sister's blood and although containing the coagulating substance it did not have the desired effect in checking the hemorrhage. He had repeatedly observed this phenomenon in his transfusion work. That the coagulating substance was present in the donor's blood was evident from the history. The donor, who had undergone an abdominal operation a few months before, made an uneventful recovery. There was no history of hemophilia to be elicited in the family records. He had had similar experiences in treating chronic infections; using compatible blood without noticing any material improvement in the patient's condition. However, on procuring a new donor, also with compatible blood, the patient made prompt and permanent recovery. In Dr. Hayden's case they selected another donor when they found the sister's blood unsatisfactory. About a tablespoonful of the second donor's blood had entered the patient's veins, when the patient remarked, "Say, Doctor, I can feel my nose swelling. I think the bleeding has stopped," and this was the case. The speaker had observed the above mentioned phenomenon in many cases, and the more of such cases he saw the more he was convinced that the laboratory tests are not reliable enough or efficient enough to be entirely depended upon when transfusing blood.

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*See page 37.

The simplicity and practicability of his method of transfusion permitted of therapeutic and biologic tests which are easily carried out and which he believed would prove to be of great value in blood transfusion work.

DR. GEORGE W. BOOT presented a little instrument made of platinum wire bent into several loops. These were filled with the patient's blood. After waiting three minutes the first loop was dipped into water; if the blood all washed out of the loop the second loop was introduced into water, after waiting another minute, the third, and so on until a loop was found coagulated. If the blood did not coagulate inside of five minutes he thought best to postpone operation.

DR. ALFRED LEWY said that he was in the habit of testing the patient's blood by means of something similar to Dr. Boot's appliance, but he had operated cases in which the coagulation test by that method showed clotting required twelve minutes, and there were no bad results from the operation. In one case in which no clotting occurred in seventeen minutes he refused to operate.

DR. ROBERT SONNENSCHEIN thought that very often the bleeding time was more important than the coagulation time. For instance, in some cases where the coagulation was slow the bleeding stopped very promptly, and vice versa; and it was true that if one knew the time it took the bleeding to stop after an injury, it gave a very good idea of the time necessary for the vessels to retract following operations. One could rest assured that the patient would not bleed much more after operations than they did at the time of an injury.

DR. NORVAL H. PIERCE said that the only reliable method, according to the most modern ideas, was to take the blood directly from the vein, never allowing it to come in contact with the skin, as from the skin chemical elements may be derived which change the coagulation time. The blood was placed in a test tube, and as soon as the tube could be turned upside down without the clot coming out the coagulation was complete. The time for a clot to form with this method was greatly prolonged over other methods. In any case when coagulation was retarded and operation on the throat or nose was necessary, the patient should receive preoperative injection of serum and a course of calcium.

DR. CHARLES LONG said that when preparing a paper on the tonsils for the Upper Peninsula Medical Society, he had been informed that Dr. Allen—then an interne of St. Luke's Hospital in Chicago—had done some original work on coagulation of the blood for the nose and throat clinic. He found the percentage of hemorrhages in individuals following tonsillectomy was greater in those persons whose coagulation was normal than in those whose whose coagulation period was higher or abnormal; therefore, it would seem that the coagulation of the blood outside the body depended upon a different cause than the coagulation in the living blood vessels.

DR. JOSEPH BECK said that in working among the wounded and seriously bleeding patients it had been a question whether transfusion of blood or other substance should be used. Three weeks previously, at a meeting of the British Medical Society, the sum and substance of four years' experience with the British Army was given, and practically all the men were agreed that a substitute for blood which effected improvement was to use a solution of gum. He left the details of the technic for a report of some cases which he wished to make after treatment by this method. They found that a gum that was soluble and not irritating when it entered the blood stream served far better than the transfusion of blood itself. There was no chance of any unpleasant conditions as in cases where blood was taken from another individual. It had been found very useful in overcoming the anemia following the bleeding.

Dr. Norval H. Pierce said that he had quite a good deal of experience with gum mixtures, and that the men in Vichy thought that gum was not nearly as good as blood, even in cases of shock. Of course it was very convenient, and the most of it had been used in cases of amputation following gas gangrene. His personal knowledge was that it did not seem to have any effect in these cases. Gas gangrene was a frightful condition, and the pathology of the disease would preclude all likelihood of a transfusion doing any good. There was no more effect from the transfusion of human blood. His impression was that the most beneficial material for transfusion was blood in all other kinds of cases.

Dr. J. Holinger reviewed the characteristics of hemophilia and stated that shortly before the war Prof. Sahli, in Bern, and Fonia, an assistant of Kocher, did some very interesting work on this subject. Sahli considers certain enzymes responsible for the lack of coagulability of the blood, but undoubtedly also the blood vessels are abnormal. Fonia thinks that a fibrinogen substance, a forerunner of fibrin, is in the blood and is brought to action by a substance contained in the blood platelets. It is set free by the destruction of the easily destroyed platelets. In hemophiliacs these platelets are scarce or entirely absent. To supply the ferment of the platelets he found the "coagulen," a substance sold in the open market, a styptic. Fonia insists that he can stop the bleeding of hemophiliacs, but others doubt it.

Dr. John A. Cavanaugh stated that it was necessary always to test the blood of the individual whose blood was to be injected into the patient. In one case he had examined the blood of six persons and mixed it with the blood of the patient and found that it destroyed the corpuscles of the blood so it could not be used. The seventh person came along and it was found that his blood could be used. He always made this test before performing a transfusion and considered it very important.

Dr. E. P. Norcross stated that he usually had his patient's coagulation time checked before a tonsillectomy. Usually those who coagulated very promptly bled more than those who did not. He thought it made little difference, but most of the patients were educated up to what should be done, and if the coagulation time was not taken they were apt to ask why it had not been. If there was no history in the family of a bleeder he was not very much alarmed about the case.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of May 5, 1919.

THE PRESIDENT, DR. ELMER L. KENYON, IN THE CHAIR.

Forceps for Ligation of Vessels After Tonsillectomy.

DR. JOHN A. CAVANAUGH demonstrated an instrument for ligation of bleeding vessels following tonsillectomy. The instrument was similar to the artery forcep. On one arm which is perforated is a groove for the passage of a catgut suture. On the other arm is a needle which passes through the perforated arm and picks up the suture and buries it below the bleeding point.

Perforation of the Mastoid Cortex.

DR. NOAH SCHOOLMAN demonstrated a patient who had suffered a perforation of the cortex.

DISCUSSION.

DR. NORVAL H. PIERCE asked where the perforation of the cortex took place.

DR. SCHOOLMAN replied that the perforation was about 1 cm. from another perforation in the posterior wall.

DR. PIERCE said that the point of perforation of the cortex in mastoid disease was important inasmuch as perforation occurs in simple suppurative processes along blood vessels. These blood vessels perforate the cortex from the periosteum and anastomose with blood vessels coming from the antrum. If a perforation occurs outside of this domain one must think of some diseaes other than the acute inflammatory processes, for instance, tuberculosis, cholesteatoma, etc., so it was always important to note just where perforation occurs. If it was along the path of the blood vessels, in all probability it was a case of simple inflammation.

DR. J. HOLINGER thought the interesting point about the case was that the boy had a complete loss of all the reflexes, and they all came back after the shell which was shown in the X-ray plate was trimmed. The vision of the eye was almost gone, but had returned to practically normal. There was absolutely no reflex to light before the operation. Both pupils were slightly dilated and absolutely immobile.

Dr. Holinger demonstrated the following two cases:

Anomaly of Pharyngeal Vessel.

Case 1.—A woman of forty-eight came to the dispensary of the Cook County Hospital on account of headaches and a discharge from her nose. At the examination pus was found on the posterior end of the middle turbinates and in the nasopharynx. In the pharynx the following anatomic anomaly was incidentally discovered: The whole region of the right posterior pillar showed a broad, flabby pulsation extending about 1 cm. medial from the posterior pillar under the mucous membrane of the posterior wall of the pharynx from the base of the tongue to behind the soft palate. The margin of the pulsating area was sharply defined by a straight perpendicular line. It was evidently a large blood vessel immediately under the mucous membrane, but what vessel? The internal carotid is round, tightly filled and not flabby and flat like this. The posterior pharyngeal artery is not as wide and not flabby. It evidently was either an aneurysm of the posterior pharyngeal or an abnormal vein.

Extensive Ethmoid Cell.

Case 2.—The patient was a man of twenty-two, who came to the Alexian Brothers Hospital four weeks before, very sick. The left eye protruded widely out of its socket and he could only count fingers. He had headaches. The whole condition had developed within the week or ten days. Dr. Abel found the conjunctiva of the left eye red and swollen, the pupilla blurred. Dr. Heym (neurologist) found all the reflexes absent. On examination of the nose the mucous membrane was red and swollen, and pus was found in small quantities in the middle meatus.

An X-ray picture showed the left frontal sinus slightly cloudy, and below it a large flat ethmoidal cell extending nearly over the whole nasal wall and a part of the roof of the orbit.

A narrow elongation extended as far as the floor of the orbit. Through a Killian incision this cell was reached from the outside, the eye pressed downward and outward. All the tissues of the orbit were very hyperemic, but nowhere could large quantities of pus be found. The frontal sinus was opened and found to contain no pus; the lining was swollen. The cell was freely drained into the nose. The mucous membrane was very much swollen. The patient improved rapidly. There was still some swelling of the conjunctiva of the lower lid, but the exophthalmus had entirely disappeared and the vision was improved.

Dr. Robert Good presented two cases with extradural irritation, following which he presented a paper entitled

Extradural Irritation and Abscess.*

DISCUSSION.

Dr. C. C. Rogers said that it was with a great deal of embarrassment that he came before this society to talk on extradural lesions when the members all were so familiar with the subject, but he thought there was no subject of more interest than this one and he knew of no condition that produced more disastrous results when the cases were neglected. He had been been working with these cases for a number of years, and he thought that with the help of specialists in this line they had been able to accomplish something which he believed would be of benefit.

Dr. Good had spoken of the dura mater, and he thought it was well to consider it in two layers, as he said, but in extradural lesions it was only necessary to consider the outer layer, which was a true periosteum, and which was not at all different from the periosteum of any other bone. Those cases that were infected from the sinus to the dura mater produced an irritation of the periosteum, and he believed they should be treated in no other way than they were treated by general surgeons if there was an infection of the periosteum of any long bone. He believed it was the custom where there was a suppurative periostitis, whether there was free pus present or not, the thing to do was to relieve the tension. This pro-

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cedure stopped the stripping of the periosteum from the bone, the destruction of the bone and the extension of the disease into the medullary canal.

If we have a subperiostitis of the tibia and cut down to the bone and relieve the tension in that way, then why should not the men in this specialty, when they have a patient diseased with periosteum in the cranial cavity which produces the symptoms which Dr. Good had shown and where there was a much more important structure on the distal side of the periosteum than on the proximal side of the periosteum on the tibia or any of the long bones, why should not the tension be removed? The only way this could be done is by lancing, and this is done in the same way as if we had to go through the tibia from the proximal side to the distal side. Go through the periosteum in the way of the least resistance. In these cases the only way that he thought the periosteum should be drained was by taking out a piece of skull and leaving it out. There was no necessity of trying to replace the bone or do a transplantation. The tension should be removed. The cranial cavity, as Dr. Good said, had just enough material in it to fill it completely. Anything added to it caused tension, and one of the most sensitive structures in the body was the dura mater. When that was irritated symptoms manifest themselves. The important thing to him was that the specialists in this line should recognize these conditions before the process had gone into the periosteum, into the inner layer of the dura or into the subdural space, or even further.

He knew that no member of this society had ever called him in consultation for a neglected condition, but he had seen at least fifteen cases of neglected mastoid conditions and two or three sinus cases where the process had gone through the periosteum and formed abscesses in the temporosphenoidal lobe. The fatalities in these cases are great, especially if it is an acute inflammatory process. It was just about as well to let a patient die without an operation, but it seemed to him that somewhere along the line someone erred. He talked plainly, as he saw it. This specialty had faults the same as general surgery. All a person had to do to become a specialist in this branch was to put the word in front of his name and a gold lettered sign on his door, and the patients did not know the difference between the members of this society and those who simply put the specialty on their card. It was hard for the public to know where they were, whether they were in the proper hands or not. He thought it was the duty of this society to be a school in itself. He believed that there would be some way to know whether a man was a real specialist in any line, because the responsibility is great. Long before they saw the neglected case this damage was done, and they were trying to work against great odds and the results usually were not very good. He believed there was no reason why a case should die from a mastoiditis any more than from an appendicitis. It was no more difficult to operate, if taken in time, than a simple appendicitis. But if it had gone through the dura to the brain then it was a serious complication and a serious condition, and he believed that it was up to the specialists to educate the general physician; and he had all the respect in the world for the general practitioner, for he had the hardest job of any of us. He saw these cases, and it was difficult for him to do what general practitioners did and keep abreast with the times. He believed it was the duty of the men of this society to go into every branch society, every county society in the state and teach their specialty and educate these men. They could be taught as much in an hour as they would learn in a month reading a journal. They would come and listen, but they would not read the journals and would not understand what they read if they did, and in a good many articles there was not much to understand anyhow.

With the symptoms that Dr. Good had shown, if these cases were not recognized in time it was the fault of the physician who saw the cases. He saw case after case of extradural abscess that should have been operated before the abscess formed. It was not necessary to have a lot of pus to have all the symptoms that had been pointed out; they manifest simply an irritation to the dura, and the slightest increase in the contents there produces pain.

One other thing that he saw time after time, and that was that about one out of every three or four of these cases of extradural abscess or brain abscess had had a lumbar puncture. That would not tell a single thing in an extradural abscess; it would only do harm, and the patient had had a damage done by having a lumbar drainage to relieve pressure. They should not be done—there was no excuse for them, no more than in an extradural hemorrhage. They were of no use in extradural hemorrhage, because if the blood pressure is 180, the cerebral spinal pressure 180, and one draws off the spinal fluid that decreased the intradural pressure and had nothing to do with the extradural pressure except that the extradural pressure would equalize itself a little more by stripping the periosteum a little farther from the skull, and that increased the abscess. Within a few hours the intradural pressure was the same as before, and all that had been done was to increase the abscess.

Dr. George Boot took issue with the speakers on four points. First, the vascularity of the dura. He had exposed the dura many times and had not found it to be a vascular membrane. In fact, it is quite the reverse.

Second, that extradural infection always preceding sinus thrombosis. Sinus thrombosis frequently occurs without there having been symptoms of extradural irritation.

Third, that some brain abscesses are too severe for operation. This he did not believe. He operated on three brain abscesses during the year preceding his entrance into the war and all recovered. Two of them were unconscious when first seen by Dr. Boot.

Fourth, the danger of doing lumbar puncture. It is not necessary to drain all the fluid from around the brain and cord. Only a little is needed for diagnosis, and this little is of great importance in diagnosis of intracranial conditions. The removal of enough fluid for diagnosis is of little danger to the patient.

Dr. Robert Sonnenschein said in reference to the point that Dr. Good made that an infection from a cavity like the sinus might involve the dura and the intracranial contents without a lesion in the bone, he could corroborate. He cited the case of a young medical student whom he saw a few years ago who had developed a very severe acute frontal sinusitis with external swelling. He did an external operation, drained and packed it, and in a couple of weeks the patient was in condition to go home. Very shortly afterwards, without any preliminary symptoms, he had a chill and sharp rise in temperature. He believed that the point of entrance for the infection was at the site of the operation, in spite of the fact that there was drainage. The sinus was opened and the posterior wall exposed, with no macroscopic lesion manifesting itself; but on removing the bone and exploring the brain an enormous frontal abscess was discovered. The patient died.

Another point which he considered good was the intranasal drainage in acute cases. He had seen Dr. Good operate a few days before in a case of acute frontal sinusitis. He had always been taught that such operative procedures in the middle meatus in an acute infection were dangerous, as there was great likelihood of an acute meningitis resulting. However, Dr. Good assured him that he had operated on these cases and obtained good results. He did not know what the state of the patient was whom he saw him operate ten days before but he knew that he had operated a good many such cases.

Dr. Norval H. Pierce said it was difficult to know where to begin in discussing Dr. Good's paper, as it covered such an extensive field and differed so radically from accepted opinion. For instance, he thought everyone had regarded the dura as a dense, connective tissue, nonvascular and comparatively insensitive membrane. He had frequently put an exploring needle through the dura when the patient was in full possession of his senses and the patient had not complained of any pain whatever. The fact that it conveys large vessels like the venous sinuses and meningeal vessels did not warrant its being regarded as a vascular membrane in the commonly accepted sense of the term. He believed that Dr. Good had tried to make the subject too simple. A severe headache, produced by an inflammatory process within the cranial cavity that was in contact with the dura, was in all probability produced by an increase of the cerebrospinal fluid. That did not mean the arachnoid or the pia was necessarily infected by living organisms, but it meant that toxins were in contact with the tela of the ventricles, which produce an increase in the cerebrospinal fluid.

The matter of attempting to make a surgical law which would embrace the treatment of ostitis of the long bone and periostitis, socalled, of the nasal accessory sinuses and the mastoid was futile, because the endeavor was based on an erroneous concept. They were two entirely different propositions, anatomically, physiologically and therapeutically. In the case of osteomyelitis of the long bone there was produced a pus filled, softened cavity that had no access to the external world except through a spontaneously or artificially made exit, whereas in the accessory sinus of the nose and of the ear we are dealing with anatomic cavities lined with a pharnygeal secretory membrane which have natural openings for the discharge of their contents. Therefore, one could not apply the same surgical principles as govern the treatment of inflammatory conditions of the long bones to the operative treatment of inflammatory conditions of the accessory sinuses of the mastoid cells. To say that one should, given an acute inflammatory process, open the accessory sinuses of the nose or the sinuses of the ear, as you would perhaps open a periosteum in a periostitis of the long bone, was bad surgery, that and nothing more, because at the beginning of nearly every case of acute rhinitis or otitis media, probably in every case, involvement of the accessory cells of the nose or ear was present. To say that one should open the mastoid cells whenever they are involved in an acute otitis media would be to say that one should exenterate the ethmoid cells in every acute rhinitis. He did not believe anyone would advocate that. Nature must be allowed to go her way as far as possible; we can only aid nature and direct her by our surgical procedures. The one who went in and tried to take matters entirely in his own hands was riding to a fall sooner or later.

He did not believe, unless there was an extremely large collection of pus between the bone and the dura, that there would be very much change in the pulse rate unless there were other intercranial factors involved. He thought everyone who had had any experience at all had seen large collections of pus between the dura and the bone without producing any symptoms whatever from the beginning to the end, until they had come upon these large collections of pus accidentally, not suspecting them at all before the operation. When such symptoms were present, as the X-rays had thrown upon the screen, as a rule it meant very grave intracranial lesions. It meant that the process had gone away beyond the comparatively insensitive dura to other portions of the cranial contents. He emphasized the point that Dr. Boot made that it was not at all dangerous to do a lumbar puncture—even in cases of brain tumor (and those were the most dangerous in which it was done), if proper precautions were observed. The lumbar puncture must be made for purposes of differential diagnosis. It would be erroneous not to elicit as many symptoms as one could in order to guide us in the proper treatment of such cases which at best present many grave and difficult problems.

DR. JOSEPH BECK was entirely in accord with the gentlemen who had previously discussed the paper. He thought that the paper was the best theoretical paper that he had listened to, assuming conditions to exist that had not been proven by any experiment or on the operating table. So far as edema of the dura was concerned, he was sure that it would require much more than merely looking at a small area to say that the dura was edematous.

Another thing was the extreme caution that had been given by a man who had had much experience concerning lumbar punctures. They had come to believe from experience that it was a great aid in the diagnosis of intracranial conditions, and they knew that they did not have to draw off large quanties of fluid and effect an abscess. He did not think it was possible to accept many points in the paper.

DR. OTTO STEIN offered two points that had some practical bearing. First, as to the sensitiveness of the dura. In operations about the hypophysis under local anesthesia by the intranasal route, one had a good opportunity to test the sensitiveness of the dura, and he had never yet, in the cases which he had operated upon, had a patient complain of the pain in incising the dura, or even in excising a large part of it as in cases of cysts. That would be a very practical demonstration of the nonsensitiveness of the dura when the patient was awake and fully able to interpret sensation.

Another point was the rather dogmatic statement made by Dr. Good as to the symptoms of extradural irritation, as he enumerated them, always preceding the intracranial complications of mastoid cases. He had seen cases recently in which none of these symptoms of irritation were present. None of them complained of any pain whatsoever, and still there was found upon operation lateral sinus involvement of acute origin, with either perisinus abscess or infected sinus thrombasis.

Dr. Robert Good (closing) stated that he knew of a number of cases of frontal sinusitis where there was external dural irritation present, which he would report later. On exposed the dura by removing the posterior wall of the frontal sinus a half drachm or more pus was found, and immediately following that the patient was relieved of all symptoms. In the above mentioned cases the intranasal operation failed to relieve the extradural symptoms. To say that the dura is not a vascular structure he thought meant that they had forgotten their anatomy. In many cases, even in children, where one removed a plate of skull the vessels were as large as the lead in a pencil and much larger could be seen. Many times he had spent several minutes in stopping the bleeding when incising the dura, and the blood in the dura weighed about as much as the dura itself. To say that it had not much nerve supply, when the branches from the ophthalmic and the sympathetic and many others, as stated in his paper, supply the dura, it must be sensitive. Take, for example, a little spicula of bone sticking into the dura, the pain was unendurable. The dura was extremely sensitive to inflammatory irritants.

In regard to opening up acute cases, no one could tell him that when there was an acute inflammatory process in the sinus with the brain structure so near by, that because of this fact one should simply go to sleep and pray the Lord to take care of it. If one had an acute otitis media it was always opened early; why should one not open an acute infection in the frontal sinus which does not yield promptly under medical treatment? He thought that he was as conscientious as any other man about getting rid of a sinusitis without operating, but if the patient was lying in bed moaning and groaning he could not sleep at night and let that patient suffer. If his own son or daughter had an acute frontal sinusitis with the symptoms of vomiting and slow pulse and the other symptoms, he would not wait to allow complications to set in. He could open up the frontal sinus just as well as some other surgeon could open the abdominal cavity, only that on account of the brain tissues so near one should operate much sooner to avoid intracranial complications. He did not believe in the theories of letting the mastoid cases lie two or three weeks without getting well. He wished to have it put down as his opinion that he believed in opening up these cases early when they were not improved in a few days by medical treatment.

Dr. John A. Cavanaugh presented a paper entitled

Submucous Correction of the Nasal Septum.

Dr. Cavanaugh advocated the elevating of the mucous membrane on the convex side of the nasal septum. He elevates the mucous membrane only on one side. When the tubercle is thickened or deflected he makes a groove below it with his septum shave, then introduces his blunt end double edged knife and elevates the mucous membrane on the opposite side over the tubercle and removes the tubercle with a biting forceps. When the bony part is deflected he breaks it over with his bone forceps, introducing the smooth blade on the attached mucous membrane side and the roughened blade on the bone of the side the mucous membrane has been elevated and fractures it, replacing same in median line. When ridges or spurs are present he elevates only on the convex side and with his septum gauge removes the obstruction. He packs only on the side the mucous membrane was elevated, leaving the pack in place for twenty-four hours.

DISCUSSION.

Dr. Robert Sonnenschein said he had that morning seen Dr. Cavanaugh perform this operation. It was very skillfully done and apparently very simple. The principle of the operation was one of conservation. By removing the piece of cartilage and leaving the groove, fracturing the crest and bringing it into the median line of the nose good breathing space was provided, as was demonstrated at the operating in the morning, where there was very little space between the inferior turbinate and the septum.

He could imagine that in some cases, such as were occasionally seen, if no modification of this technic was employed it might be a little difficult to get a large space at the internal portion of the nose. He thought the operation was a very good one and that it would obviate the conditions they so frequently saw where practically all of the septum had been removed.

Dr. E. P. Norcross stated that he also had seen Dr. Cavanaugh operate that morning, and as the Doctor had never seen the patient before he thought that it was a particularly good demonstration of the operation. He did not think that the Doctor removed one-third the amount of cartilage that the ordinary submucous operation took at the first cut, and he did not think that the entire amount of bone and cartilage removed in this operation was more than one-third of that amount. He thought it required more skill than the ordinary resection. There was no limit in the ordinary operation to the amount that could be taken out, but here one had to use a little more ingenuity in order to know where to make the shave.

Another point was the very slight pressure which the doctor used in fracturing the perpendicular plate. He expected to see him use a great deal of pressure, but before he realized that he was beginning he was through.

Dr. Alfred Lewy asked whether it was applicable to broadening and thickening of the maxillary ridge, and whether it could be applied to cases of thickening far back.

Dr. H. L. Pollock said that he had the pleasure of witnessing the operation, and while he had never performed it, he thought that Dr. Cavanaugh had not taken sufficient time to make it quite clear how the operation could be applied to different forms of cases. In the case that he saw him operate on he had a very broad submaxillary ridge and he got rid of that by using a chisel. In this case it was broad on one side, and he simply dissected it down, after taking out the cartilage as was done in an ordinary operation, and then chiseled this maxillary ridge off. He thought that the operation had many advantages and that it was a very good conservative plan. He believed that with a little dexterity and skill on the part of the operator it could be made to fit every case. He realized that in most of the submucous operations too much material was taken away. In an effort to get at the thickening high up too much cartilage was removed, and this operation did away with that and left the cartilage, and there was much less likelihood of perforation and also of hemorrhage. It was almost impossible to get a perforation. The only thing he thought was that the doctor did not remove enough tissue. Everyone knew that bone and cartilage would spring back if they left some in, when pressing the ethmoid region; one might think that it was not obstructed and that it was straight, but after it healed it would spring back and the patient would complain of the same difficulties as before. He had not seen the end results of this operation, but he believed that it was a very good practical one, although it required more skill than the old operation. If the little projections of cartilage would not spring back he thought the operation would be ideal.

DR. CAVANAUGH (closing) said that the operation was a simple procedure, but it was necessary for the operator to use his head. As far as the bulging part of the process which Dr. Pollock spoke about was concerned, there was absolutely none of that with this operation. That could always be overcome by placing the shave in the proper place, as illustrated by the cuts. This operation could be applied to a bulging cartilage anywhere it was found. It was not necessary to make the groove in any one place; it could be made where it was essential in order to get the flap back into the proper position.

As to the spur far back, Dr. Cavanaugh elevated the mucous membrane on the convex side, leading the tip attached to the mucous membrane, which he severed. He then put his chisel in front of the elevation where it began, and drove it through with a hammer so that the spur was removed. Where there were ridges on the floor the operation was performed in the same way. One of the illustrations showed the exposure on the opposite side; he removed a piece of cartilage at one point and elevated the mucous membrane and with his chisel cut away the obstruction, leaving the balance of cartilage in position. In the big bone deviations, it was only necessary to proceed as he did in the case operated upon in the morning. Dr. Cavanaugh said he was very glad to demonstrate the operation to anyone who cared to see it at any time.

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XLII.

SERIOUS COMPLICATIONS IN THE PUNCTURE OF THE MAXILLARY ANTRUM. INVESTIGATIONS, BY EXPERIMENTS ON ANIMALS, OF THE REFLEXES PRODUCED FROM THE MUCOUS MEMBRANE OF THE ANTRUM. AIR EMBOLI AFTER ANTRUM PUNCTURE.

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It is a well known fact that occasionally, though fortunately seldom, puncture of the maxillary antrum may be attended with surprising and alarming phenomena in the form of long attacks of unconsciousness, often accompanied by convulsions. In the special literature available to me, I have found only nine fairly satisfactorily described cases, where the phenomena

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in question have been observed. Boenninghaus may, however, be right in saying that alarming symptoms after antrum puncture occur more frequently than is generally known. In my own practice and that of some of my colleagues no less than seven cases have been met with, a fact that seems to indicate that these dangerous complications are less uncommon than might be supposed, judging from the literature on the subject.

And even if these phenomena occur seldom, a great deal of attention should be paid to them as no less than the patient's life or health is at stake. In the nine cases found in the literature death supervened four times and in the seven cases collected by me, twice. There are evidently very good reasons for examining the various factors that may have brought about this result, especially as, to my knowledge, no satisfactory explanation of the mystical antrum exists. In this connection it may therefore be of interest to give a survey of the cases already published and of those met with in my own practice. The best known cases in the literature on the subject are probably the four mentioned by Claus.

1. A young girl of 19 had twice in the course of five years been treated for a left-sided maxillary inflammation. On both occasions a fairly large opening was made into the antrum through the lower meatus. Two years after the second treatment there was another recurrence of her antrum empyema. By that time there remained only a small fistula barely large enough for the passage of a probe through the previous opening in the lateral wall. A new puncture was therefore made with the commonly used Lichtwitz needle. It then appeared that the bone was so greatly thickened that the needle could hardly be made to penetrate it. An entrance into the antrum was however, successfully effected, and the air could be heard passing into the nose when the syringe was used. Suddenly the air met with considerable resistance, so that more than ordinary force had to be employed in order to compress the bulb. At the same moment the patient became cyanosed, with dyspnea and a feeling of fear, but with a strong, quiet pulse (75). She was immediately placed in a horizontal position and then quickly recovered, the cyanosis and dyspnea disappearing in the course of about ten minutes. There remained, how-

ever, a peculiar feeling of oppression for a couple of hours, but the next day she was as well as ever. The author supposes it to be a case of air embolism. The needle might possibly have been drawn backwards in the thick bone channel and the air driven into the cancellous portion of the bone.

2. A man, aged 68, suddenly lost consciousness after puncture of the antrum. On closer examination it appeared that the patient's right arm and leg were paralyzed, but not his face, and that he was unconscious and did not answer when addressed. Pulse strong and regular. On the following day the patient was clearer; he knew the doctor and could name various objects. His speech, however, was indistinct. He was able even then to move his right arm, and six days later no paralytic phenomena were apparent. Claus has here diagnosed cerebral apoplexy in the left hemisphere. He also does not consider it impossible that this has been a case of arterial spasm, a poisonous effect of the novocain adrenalin administered.

3. A young woman was treated with irrigation of the right maxillary antrum, and was twice syringed without unpleasant consequences. Immediately after a third syringing, cyanosis suddenly supervened, with loss of consciousness and an uncountable pulse, stertorous breathing and fixed pupil. Notwithstanding the administration of stimulants and artificial respiration, death occurred shortly. The anesthetic employed was six drops of a 10 per cent novocain solution with three drops of adrenalin in 20 minutes. The postmortem gave entirely negative results. According to Claus' view, the patient died of heart paralysis as a consequence of novocain poisoning.

4. A woman, aged 36, was anesthetized with a 10 per cent novocain suprarenin solution (1 per cent of an adrenalin solution 1/1,000) applied to the lower meatus on a tampon, and followed by painting 10 per cent cocain on a thin swab over the inferior turbinated bone and inferior meatus. Puncturing of the antrum was thereupon performed without difficulty with a Lichtwitz needle, and air was then injected into the antrum. At the same moment the patient lost consciousness, with suspended pulse and respiration. After camphor caffein injections and a saline infusion the pulse and respiration im-

proved; but consciousness did not return and the comatose condition passed into death.

At the postmortem examination there was found, among other things, a hemorrhagic infiltration, 5 centimeters in length and 2 centimeters in width, in the epicardium of the right ventricle. The infiltration could be traced right through the ventricular wall into the endocardium. A similar infiltration was also seen in the septum membranaceum. The heart, which was opened under water, contained no air. In the gray matter of the brain some slight hemorrhages were found. After opening the fourth ventricle, extravasations were also observable in the arbor vitæ and in the lower part of the cerebellum.

In this case, too, Claus considers that novocain poisoning was the cause of death.

Among other writers, Hajek, in his "Pathologie und Therapie der Nebenhöhlen der Nase," points out that long attacks of unconsciousness may now and then occur in connection with exploratory punctures. These must not be confounded with the slight fainting fits that are not infrequently seen during intranasal manipulations, due partly to the effect of the cocain and partly to the feeling of fear and the psychic shock which often attend the operations. The long attacks of unconsciousness "durch den Eingriff ausgelöste hystero-epileptische Anfälle," may last for hours, and are not infrequently associated with covulsions. Hajek has repeatedly observed, especially in patients with a narrow ostium maxillare and a bad outlet for the fluid, long periods of malaise with cold sweats and palpitations, and slow strained pulse (down to 60 as against 70 and 80 normally). The author considers these symptoms as the expression of a vagus irritation produced reflexly through irritation of the second branch of the trigeminal. Hajek once had a case of true apoplexy after antrum puncture, from which the patient, a diabetic, with arteriosclerosis, died within 24 hours.

Killian, in 1913, at a meeting of the German laryngologists at Stuttgart, described a case of sudden "antrum death" after syringing of the antrum. A postmortem, with special examination of this cavity, gave an entirely negative result. The only thing that could be definitely established was that the syringed water had been cold. During the discussion that followed. Streit (Köningsberg) stated that after syringing through the middle nasal fossa, he had observed temporary paralysis of both legs, and temporary disturbance of vision. Siebenmann (Basel) considered the attacks of giddiness after irrigation of the antrum to be action of the vagus produced by trigeminal irritation.

Neuenborn treated a young man of 23 for double sided antrum empyema. On the left side puncture and syringing were twice performed without inconvenience of any kind. Two days after the second treatment the right antrum was punctured, with subsequent evacuation of pus and injection of air. Immediately after the removal of the canula, the patient fell from his chair, respiration ceased and the pupils were fixed and dilated to the maximum. His face was pale with cyanosed lips. His entire body was rigid and in a condition resembling that of tetanus, so that artificial respiration could not be proceeded with, owing to muscular spasms. The pulse was good and regular, 72. Massage of the diaphragm was performed until, after 25 minutes, spontaneous respiratory movements recommenced. These were at first irregular, with frequent interruptions, and the massage had therefore to be continued. After some time the condition of tonic spasms improved, but became worse again directly an arm or leg was moved. It was only after two hours that the spastic condition passed away; but it returned again later with tonic spasms alternating with clonic contractions. The pupils were still fixed and dilated to the maximum. During the three following days the patient was unconscious, but with normal pulse and temperature, except for one rise in the latter to 38.2 the day after the first attack. On the fourth day after the puncture, consciousness began to return. The patient then complained of headache and nerve pains with spots specially tender to pressure over the trigeminus and the ischiadicus.

The author maintains that this was a case of cocain poisoning. He recalls, in this connection, E. Falk's investigation of the toxic effects of cocain, according to which the respiration is first of all affected, and that consequently a death from cocain is due to a cessation of respiration. The above case, with good, strong pulse all the time, would therefore answer particularly well to the characteristic picture of cocain poisoning. Neuenborn does not, however, seem to be quite sure of the matter. He points out, for instance, that the cocain solution (7½ per cent, of which about 0.1 gm. was soaked up into a thin wool swab for painting three times) was very weak, the patient moreover having repeatedly been anesthetized before with the same solution. The author therefore believes that something else may have supervened, which he cannot explain, but imagines must be sought in the actual syringing.

Henrici has also described two cases that are of considerable interest. In the one case, in which the patient suffered from empyema and formation of polypi, the polypi were removed under local anesthesia, with subsequent irrigation of the frontal and maxillary sinuses. While one of the antrums was being syringed the patient suddenly collapsed and had an epileptoid attack, with cyanosis and trismus. Respiration was labored, and the pulse weak and irregular. The pupils were fixed. The patient recovered quickly, however, apparently without unpleasant consequences. The following day the antrum was again syringed. The result was the same as before. The lockjaw this time was so severe that the mouth could not be opened with a gag. The chest was quite rigid as a probable consequence of the spasmodic contraction of the respiratory muscles. Even after tracheotomy it was impossible to carry out artificial respiration, and the patient died without regaining consciousness. A postmortem examination gave an entirely negative result.

In the second of Henrici's patients, too, nasal polypi were removed under cocain. After 10 per cent cocain applications to the middle meatus, the antrum was to be syringed through the middle nasal fossa. As soon as the syringing began, an epileptoid attack occurred also in this case, with labored respiration, cyanosed face, and clonic contractions in the arms and legs. The pulse was suspended. Under artificial respiration and heart massage, the patient grew rapidly better, but for a time both arms and legs were paraplegic. For a little time after the attack, she was not quite mentally clear. She was unable, for instance, to explain where she was. By degrees, however, all the phenomena disappeared; but for two or three years after the treatment the patient felt a weariness in her arms and legs, and was forgetful and listless. Henrici draws attention to the fact that neither of his patients suffered from epilepsy or any other inherited ailment. He could not explain the cause of the attacks, nor whether it was cocain or some other factor that had contributed to their occurrence.

Zarniko gives an account, in his textbook, "Die Krankheiten der Nase und des Nasenrachens," of a woman of 50 who was subjected to a puncture of the antrum. The perforation was made through the lower nasal fossa, and the operation was performed with the greatest ease. When Zarniko proceeded, after injecting air, to rinse out the cavity, the patient suddenly collapsed with a sigh. Her face was pale, the skin cold and covered with perspiration. The pupils were fixed and dilated to the maximum, and the pulse and respiration were suspended. She was immediately placed upon the floor, and artificial respiration was begun. The patient's condition was very critical, and Zarniko even feared that death might occur at any moment. By means of artificial respiration and stimuli, however, the color was brought back after a time to the bloodless lips; a faint moaning respiration was heard, and the patient awoke to consciousness. In the course of an hour she was able to go home. The author considers this collapse to have been only a result of trigeminal irritation. The patient was not weak or apprehensive, and had had cocain several times before without any poison effect having been observed.

From these cases it will be seen that the literature on the subject contains only scanty information regarding bad results after puncture of the antrum. A continued search might possibly bring others to light, but it is not likely that their number would be very great. The literature does not, however, give an entirely correct representation of the matter as it appears in practice. These tragic cases, indeed, are rare, but scarcely as rare as our literature on the subject would make it appear.

In addition to the cases mentioned above, I shall describe four that have occurred in my own practice.

1. A man of 51 had been for some considerable time under treatment for double sided acute antrum empyema. On the left side the antrum, after local anesthesia with 10 and 20 per cent cocain solution, was punctured and then syringed several times through the artificial aperture without causing any inconvenience to the patient. As the secretion on the right side, in spite of conservative treatment, continued undiminished for a considerable period, an opening was to be made here too into the antrum. An exploratory perforation was first made with the ordinary Lichtwitz needle through the lower meatus. The bony wall on the right side, like that on the left, was hard and thick. After it had been perforated, air was as usual first introduced in order to find out whether the ostium maxillare was permeable. It then appeared that the air injected met with considerable resistance. At the same time a peculiar bubbling sound was heard inside the antrum, and suddenly the patient sank down unconscious, his face becoming cyanosed. Respiration had ceased instantaneously in the inspiratory position. The jaws were firmly pressed together, and the whole body was rigid, as if the muscles of both the trunk and the extremities were in a condition of general tetanic contraction. The pupils were not especially dilated, but were completely fixed. The pulse, which at first could not be counted, was later felt to be rapid, irregular and small. How long this condition of absolute cessation of respiration lasted cannot exactly be said. A wedge was quickly, though with considerable difficulty, pushed in between the teeth, and the tongue drawn forward, whereupon a few irregular stertorous respirations occurred. The convulsive rigidity of the extremities at the same time gave place to clonic contractions in the upper and lower extremities. As soon as possible, after camphor caffein injections, artificial respiration was begun and carried on without much difficulty after the tonic spasms had ceased. The patient's condition now gradually improved. The irregular, stertorous breathing ceased and the cyanosis disappeared. After about 20 minutes consciousness returned. The patient was immediately put to bed, and by the next day was well enough to be discharged. For several weeks, however, he felt tired and without interest in his work.

According to his own statement, the patient had always been strong and well, and in his own opinion bore physical exertion without difficulty. He did not give one the impression, however, of being a strong man, but on the contrary looked delicate. It was subsequently stated by his relatives that 30 years previously he had had two epileptic fits, but as far as they knew there had been no recurrence of them. There was, moreover, epilepsy in his family, two brothers who died at the age of 35 having suffered much from that disease. There was nothing remarkable about the heart and lungs. The urine showed normal conditions. Has since been reepatedly examined by internists with negative results.

2. A man of 54 had been treated for acute left sided influenza otitis with paracentesis. On account of constant violent pain in the left half of the face and in the teeth on the same side, a puncture of the maxillary sinus was performed in order to ascertain whether inflammation of that cavity was the cause of the pain. The perforation of the bone, which was performed under cocain, with a 10 and 20 per cent solution, required the exercise of considerable force, as the bone in the lower meatus was thick and hard, so that the trocar only penetrated by slow degrees. During the injection of air, a bubbling sound was heard and interpreted as a collection of fluid in the cavity. In this patient, too, the air appeared to meet with more resistance than usual, though not greater than may often be experienced when the ostium maxillare is narrow. It was therefore thought that syringing could be carried out without risk. Just as the syringe was being transferred, however, after the injection of air, to the water vessel, the patient dropped from his chair under circumstances resembling those just described in the case of the first patient, with cyanosis, absolute cessation of respiration, fixed pupils not greatly dilated, uncountable pulse. Both body and extremities were rigid, the entire muscular system being in a condition of general tetanic contraction. Notwithstanding the trismus that was present, we succeeded in opening the mouth and drawing the tongue forward, whereupon artificial respiration was begun. The continued respiratory spasm, however, at first occasioned very great difficulty; but after a time, it is not known how long, involuntary respiratory movements could be ob-

served, the first very shallow and irregular, but, with continued artificial respiration, becoming constantly deeper. After camphor caffein injections, the pulse could once more be felt. It was feeble, irregular and rapid, 100 to 120. After from 15 to 20 minutes the corneal reflex returned, and after about 30 minutes the patient regained consciousness, though at first he was confused. He did not know, for instance, where he was; and it was not until half an hour later that his mind became sufficiently clear for him to understand his surroundings in a measure. In contrast to the first mentioned case, there were no convulsive movements. The muscles of both the trunk and the extremities appeared throughout the attack to be spastically contracted. After the attack, too, the condition of tetanic irritation continued in upper and lower extremities. Arms and legs were thus rigid, and could not be actively moved, and passively only with difficulty. At the same time the patient complained of a peculiar feeling of numbness, especially in hands and feet. His condition improved, however, rapidly. In the course of an hour he was once more able to move his arms and legs, though not without considerable difficulty. If he attempted, for instance, to raise his right or left hand to his mouth, he failed to do so, the hand moving out to the side. If he wanted to move his foot from one side to the other towards a certain point, the leg, indeed, could be carried over in the right direction, but the foot kicked out into the air when it was meant to touch the given point. The patellar reflex was lively, but did not appear to be increased to any great extent. The same evening, six hours after the trauma, the arms could be moved considerably better, but did not regain their full power until the next day. For a long time, however, the pressure of the left hand was weaker than that of the right. The patient had to remain in bed until the second day after the puncture. The right leg was then sufficiently well for him to be able, when supported, to limp across the room; but it was not until the fourth day after the attack that the left leg could be used with any feeling of security. The numbness, which was strongly marked in the left leg, especially during the first few days after the trauma, was also sufficient to necessitate the use of a stick during the six to eight weeks following.

Three years later the patient still complained of feeling a little numb in his left foot, especially in the second and third toes, so that he felt insecure when, for instance, he went up or down stairs. A thorough examination was then made by a nerve specialist, but no disturbance of sensation could be found.

It was considered that the idea of disease of an organic nature was on the whole precluded.

The patient was a slight, somewhat nervous and overworked man, but was considered to be energetic and capable in his calling. Had further always had good health except when, during a very fatiguing visit to America, he had been rather subject to heart trouble. Had never had epilepsy nor was that disease in his family. Lues was denied, and Wassermann was negative. There was nothing remarkable about the heart, lungs and urine, either in this or in any subsequent examination by specialists for internal medicine. A skiagram of the maxillary antra showed both to be large and well developed.

2. In a farmer of 61, with symptoms of an empyema of the antrum of Highmore, the antra were about to be examined. After local anesthesia of the left lower meatus with a 20 per cent cocain solution, the perforation was performed quickly and easily in the ordinary way. The antrum contained numerous mucopurulent lumps. In manipulating the left antrum, a wool holder with 20 per cent cocain was introduced into the lower nasal fossa on the right side, after which the puncture on that side was performed without difficulty. While this was going on the patient was apparently well, but complained that the anesthesia was considerably less effectual than on the side first punctured. There was then no indication of the cocain intoxication. The pupils were not dilated, and the patient was talking all the time about his case and the troubles consequent on it. When the perforation on the right side had been effected, the injection of air was proceeded with. As the air at first passed through the antrum without resistance, several compressions of the bulb were made in rapid succession, and at last a mucopurulent mass was blown out through the maxillary ostium, which it blocked as it passed through. As a consequence of this the pressure rose in the

antrum and could be distinctly felt in the bulb, which required greater force to compress it than before, in order to remove the lump of secretion from the antrum. At that instant the patient fell prostrate, cyanosed and without respiration. Stimuli and artificial respiration for about half an hour produced no result. Death seemed to have been instantaneous.

There was no opportunity of making a postmortem examination. A wide opening was made, however, in the canine fossa. The antrum was found to be very large and the punctured opening in the usual place, apparently without having detached the surrounding mucous membrane.

The patient was said to have always been a strong, healthy man, one of those mountain dwellers who can bear great physical exertion without ill effects. No further particulars were available.

4. A farmer of 62, with left sided antrum empyema of uncertain duration, was to undergo puncture of the maxillary antrum. This was done through the lower meatus quickly and easily after anesthetizing with a 20 per cent cocain solution. As the man had bronchitis, with sibilant breathing distributed over the dorsal surface, and was also pale and exhausted looking, he was placed, for safety's sake, on a couch before the injection of air was begun. The cocain did not appear to have caused him the slightest inconvenience; and notwithstanding careful observation, no indication of cocain poisoning could be discovered. No dilatation of the pupils. Without any difficulty whatever, the patient walked, with the needle inserted, into the adjoining room and sat down upon the couch. He felt at that time quite well. A careful injection of air immediately showed that the air met with considerable resistance. As soon as the pressure in the antrum was increased, the patient began to complain of difficulty in breathing. He could not get air, was cyanosed, and had a marked feeling of apprehension, cold sweat and uneasiness. He was immediaetly placed in a horizontal position, and the trocar was removed. Respiration was irregular and shallow, coming in groans, and the face was still cyanosed. The pulse was small, hardly perceptible. In the course of ten minutes the respiratory movements became once more deep and regular, the cyanosis disappeared, and the patient felt

better. Half an hour later he was quite well again, and was able to leave the consulting room without assistance.

This case greatly resembles Claus' case No. 1, where similar symptoms appeared without, however, being followed by serious complications.

In addition to the above four cases, I have collected, in chance conversations with colleagues, three more cases, which I am kindly permitted to describe.

1. Reported by recollection by Dr. Fleischer, Kristiania.

In a young, apparently healthy woman, antrum puncture was to be performed. The needle was introduced through the lower meatus, where the bone was thick and difficult to penetrate. The puncture was performed, however, as usual. During the air injection that followed, the patient sank down unconscious, with stertorous, irregular breathing. The comatose condition continued until death supervened twelve hours later. The postmortem gave no definite explanation.

2. Reported by Professor G. Holmgren, Stockholm.

A woman of 65 was treated for a chronic maxillary sinusitis with slightly fetid secretion. Syringing was performed on several occasions, when, on account of the narrow space and of the patient's sensitiveness, a Lichtwitz needle was employed through the lower meatus. After the introduction of the needle, and before the syringing, air was injected. Immediately after this the patient became deathly pale and pulseless and collapsed. At the same time a peculiar gurgling sound was heard, as of tiny air bubbles. They gave an impression of moving quickly down along the jugular vein. The patient was much exhausted for many hours, but grew better later; and on the next day she had recovered without any ill effects worth mentioning.

3. Reported by Dr. Roll-Hansen, Kristianssand.

The patient was a woman of 34, who, up to that time, had always been well with the one exception that for a rather long time she had been troubled with obstruction of the right half of the nose.

On examination, the right nasal cavity was found to be almost filled with polypi, which appeared to come from the anterior ethmoidal cells. After local anesthesia with cocain (15 per cent), some of the cells were removed in the usual way and without difficulty. The patient was quite well after the brief treatment. In order to ascertain whether there was also an antrum empyema, a puncture was made under cocain anesthesia, with an ordinary straight cannula, in the usual place below the inferior turbinated bone. There was great difficulty in passing the canula through the bone, on account of the hardness of the latter. As the needle pierced the bone the patient turned rather pale. The perforation was nevertheless completed, and then a careful injection of air was attempted. The air could not be heard to pass out through the ostium maxillare, but at the first pressure on the bulb of the syringe the patient suddenly fell to the floor as though struck by lightning, and lay there at full length, quite unconscious. There was complete rigidity of body and limbs, respiration was rapid and stertorous, and the pulse was also rapid, about 120 (average). The attack lasted five minutes, after which consciousness returned. Tonic rigidity of the trunk and extremities were found, but on the other hand no clonic movements. The color of the patient's face during the attack was paler than her normal, somewhat ruddy complexion. When consciousness returned, she was able, with the nurse's assistance, to walk into the adjoining room, where she was put to bed. For a time immediately after the trauma, the patient suffered from paresis of the right arm. About five hours after the puncture a fresh examination was made. Aphasia was then present. The patient could not find the right words and was unable to recollect even quite ordinary expressions. The pressure of the hand on the right side was rather weaker than on the left. After five days had passed, all the phenomena disappeared, and there was no longer any aphasia. She left the clinic without further trouble of any kind.

The cases that have now been mentioned may together form a very good foundation for a solution of the problems that in this connection present themselves. When we endeavor to ascertain the nature of the factors that have here cooperated we must in the first place keep in mind the fact that from a theoretical point of view the alarming symptoms may just as well have originated in what took place before the operation, namely, in the anesthetizing, as in the operation itself, with the subsequent injection of air and syringing. We will first consider the cocainization and the part it may be supposed to have played in these cases.

COCAIN POISONING

and its symptomatology are discussed in detail, inter alia, in Paulsson's "Lehrbuch der Pharmakologie." The author emphasizes the fact that acute cocain intoxication presents a varying picture. The slighter cases appear as a feeling of languor, giddiness, fear, pallor and indications of syncope, or as excitement, talkativeness, hallucinations and delirium. In more serious cases there is also dilatation of the pupils, dryness of the mucous membranes, vomiting and clouded sensorium. The heart is always affected, with irregular pulse, now rapid, now slow, pale face and the tip of the nose cyanosed, occasional rises of temperature, finally collapse with cessation of circulation and respiration (Cheyne-Stokes). In addition clonic contractions or tetanus, after which death ensues as a consequence of heart and respiration paralysis. After injection of large quantities, e. g., one gramme, death may be instantaneous. It is difficult to say what the lethal dose is. Serious symptoms have been observed after only a few centigrammes, and little or no harm has resulted from a dose many times larger. It may therefore be assumed that individual disposition has something to do with the matter. Cocain in concentrated form is very much more dangerous than in weak solution, as in the first case a considerable portion of the poison is absorbed, while in the diluted form it is to a great extent confined to the place of application and rendered innocuous.

The toxicity of novocain is only from one-sixth to one-eighth that of cocain. Paulsson has experimented upon himself by injecting 0.4 and 0.75 gr. After the first dose no symptoms of poisoning appeared, and after the second only transitory symptoms.

It will from this be apparent that it is only the serious cases of cocain poisoning that can come under consideration in connection with our histories of cases. How large the dose must be to prove fatal in any particular case is not known; but we should at least be able a priori to take for granted either that the dose administered must have been excessive as compared with that ordinarily used, or that these patients must have had an idiosyncrasy for cocain.

If we now consider the doses given, we find, as already mentioned, the following: For anesthesia sometimes novocain adrenalin, and sometimes cocain is employed. Novocain is used by Claus in a 10 per cent solution, of which 6 drops plus 3 drops of adrenalin are placed in the inferior meatus for 20 minutes. That these small doses should be capable of producing poisoning symptoms of the most serious nature is contrary is all our experience in the employment of novocain adrenalin in intranasal operations. By way of comparison it is only necessary to recall Paulsson's experiments, among which 0.4 gr. of novocain were even injected without the slightest effect of poison. Claus himself maintains that it must have been a novocain poisoning, but expresses, it is true, his astonishment that this should twice occur in this particular operation of puncturing and syringing the maxillary sinus, when otherwise, notwithstanding an extensive employment, both clinical and polyclinical, of novocain, he had never seen unpleasant consequences from this anesthetic. Neuenborn has used cocain in a 7½ per cent solution, of which 0.1 gm. is taken up by a thin wool swab which would then contain 0.0075 gm. of cocain. It is stated that with this solution anesthesia is attained only after three applications of the swab. Neuenborn thinks that this minimal dose has produced cocain poisoning in his patients; but he does admit the possibility of the occurrence of a further factor, which he cannot explain, but which he thinks must be sought in the syringing itself.

In the discussion that took place in connection with Neuenborn's statements, it was maintained in many quarters that it could hardly have been cocain poisoning from the application of so weak a solution. Henrici, for instance, who, in the cases reported by him, had employed 10 per cent cocain in careful doses, is emphatic in his opinion that some other factor must have been active.

On my own patients I have used cocain in 10 and 20 per cent solutions. The anesthetization was performed in the following manner: An Uchermann's wool holder was firmly wound round with wool, and saturated first with 10 per cent, and in the final swabbings with 20 per cent cocain, which was rubbed into the front part of the inferior meatus only at the place where the perforation was to be made. In order to prevent the cocain, when introduced into the narrow nasal passage, from being pressed out of the swab and running back into the nasopharynx, the swab is always squeezed out, and is thus never wet, but only damp. The last swabbings before the perforation is made, are, as I have said, with 20 per cent solution, as experience has convinced me that a solution of that concentration is necessary to obtain sufficient anesthesia, especially where the bone is thick, and where, moreover, there is inflammation in the antrum. Personally I consider even a 20 per cent cocain solution, employed in the above manner, to be quite safe. On all the thousands of occasions on which I have administered cocain, both when acting as assistant physician at our State Hospital and in my private practice, I have never once observed dangerous symptoms of poisoning after 20 per cent applications administered in this manner. Slight intoxications, such as languor, giddiness, etc., may of course have occurred; but these phenomena have always quickly disappeared when the patient has been placed in a horizontal position. To the best of my belief cocain solutions of 20 per cent strength have been used for a number of years in the State Hospital's Otolaryngologic Polyclinic in Christiania without serious consequences ever having been observed. Moreover in the cases in question only a relatively small part of mucous membrane was anesthetized. If a 10 to 20 per cent cocain solution, employed as indicated above, were attended with danger, it seems remarkable that the unpleasant consequences did not first of all appear in one of the intranasal operations, where the cocainized region was of far greater extent than the case here. It is possible that among the cases described in the literature on the subject there have been some individual instances of intolerance, although this explanation does not seem especially obvious, considering that most of the patients had been anesthetized several times before the fatal puncturing (Claus', Neuenborn's and Henrici's cases). Of my patients, No. 1 was treated with cocain adrenalin every other day for two or three weeks without the slightest ill effects. In the case of No. 2 a series of cocain administrations with a 20 per cent solution was subsequently given for another nasal affection, without occasioning the slightest inconvenience to the patient.

A perusal of the history of the cases shows, moreover, that these attacks have not followed directly upon the anesthetizing. In none of my patients could any sign of poisoning be discovered after the cocainization. Nor does the little shock which so often accompanies the perforation of the antrum wall appear to have been of any importance; on the contrary, the patients stated, after the perforation, that they felt quite well. It was not until the injection of air or the syringing was performed that the alarming phenomena appeared. If it was an effect of cocain that here asserted itself, it is very remarkable that without any premonitory symptoms whatever, it should appear in apoplectic form, in immediate connection with the introduction of air or of water into the antrum.

There is on the whole so much here that speaks against the theory of cocain poisoning that it is impossible to feel entirely satisfied with this diagnosis. The anesthetization may be a predisposing factor, but scarcely the decisive one. There must be, as Henrici says, some other factor that is cooperative. We ought therefore first of all to see whether an explanation of these mysterious phenomena cannot be found in the operation itself and the consequent injection of air into, and syringing of, the antrum. We have here only two possibilities to consider. There must either be, as several writers have indicated, a reflex of an unknown nature from the mucous membrane of the antrum, or the operation must have produced an air embolus.

I will first mention the points that favor the former of these possibilities, the reflex theory. Before describing the investigations connected with it, it will be as well to give a general survey of the reflexes originating in the nasal mucous membrane itself.

THE NASAL REFLEX NEUROSES.

The nasal reflexes, or reflex neuroses, are well known and have been much discussed, particularly in the special literature of the eighties and nineties of the last century, while the antrum reflex still remains a terra incognita. As, however, the mucous membranes of the maxillary antrum and of the nasal cavity are innervated by the same nerve trunks, it is obvious that all the reflexes from the mucous membranes of the nose and of the antrum should be viewed from the same visual angle and all treated alike as nasal reflex neuroses.

It has long been known among rhinologists that a number of diseases occurring especially in paroxysms have been affected by intranasal treatment of the pathologic changes in the mucous membrane of the nose. Voltolini was the first to emphasize the connection that there appears to be between various asthmatic conditions and nasal polypi. As the asthmatic attacks became less severe after the removal of the polypi, it was his opinion that the latter were the cause of the asthma, and he came to the conclusion that "either the polypi reflexly produced the asthma, or these new formations, in obstructing respiration, altered its chemical processes and thereby the structure of the lung tissue."

Voltolini's work, however, aroused no special attention. It was Fraenkel who first of all caused the nasal reflex neuroses to become a much discussed subject in the special literature of the eighties of the last century. Fraenkel, in his well written work, "Ueber die Zusammenhang von Asthma nervosa und Krankheiten der Nase," maintained that asthma with nasal polypi must be regarded as a reflex spasm localized in the bronchi muscles, called forth by an irritation of the sensory nasal nerves. In response to Fraenkel's work, contributions poured into the medical journals from all sides. At first the discussion had special reference to bronchial asthma and its relation to intranasal pathologic changes of various kinds. It was not long, however, before the field of nasal reflex neuroses was extended to other subjects. Hack and his pupils, among them Fliess, led the way. One group of diseases after another was said to have its origin in pathologic changes in the nasal mucous membrane—migraine, supraorbital neuralgia, vasomotor disturbances of the vessels of the skin, epilepsy, amaurosis, articular rheumatism, Basedow's disease, diabetes, diseases of the heart and stomach, dysmenorrhea, etc., ad infinitum. Everything was due more or less to nasal reflex neuroses, which at last seem likely to become the inexhaustible source of all evil.

As a matter of course, all these articles on the subject of healing diseases of the most varied character by galvanocautery or other intranasal treatment, made a great sensation, and criticism was not long in making itself heard. The exaggerations were sharply attacked, and the enthusiasts who had gone to extremes were unable, in the long run, to maintain their position. There was a great rebound, and skepticism even went so far as to deny altogether the existence of reflex neuroses. A detailed account of the numerous contributions of the eighties and nineties of the last century would here carry us too far, for they occupy too much space in the special literature. The contention about the nasal reflex neuroses has been of great importance from the fact that it has drawn attention to the by no means insignificant part played by the nasal mucous membrane and its reflexes in pathology. A brief account of the present view held by rhinologists as expressed, inter alia, by Jurasz, will therefore have a certain amount of interest.

Furnished with an abundance of sensory and easily irritated nerves, the nasal organ performs, by means of reflexes, a number of its most important tasks in respiration. The reflexes are produced and regulated by physiologic irritation, the consequence being that before it reaches the lungs the air inspired is warmed, supplied with moisture, and freed from injurious pollution. The nasal organ further represents a protective apparatus for the organism, guarding it, by means of its reflex operations, sneezing, coughing, spasm of the glottis, and cessation of respiration, against gases that are injurious and dangerous for the body. This reflex mechanism, whose operations are of an entirely physiologic nature, may also, however, through the numerous connections between the nasal organ and other parts of the body, produce morbid results, if the nasal mucous membrane for some reason or other becomes abnormally sensitive. It is then no longer the normal physiologic reflex with which we have to do, but the pathologic reflex action, the reflex neurosis. Notwithstanding that the mucous membrane of the nose is continually exposed to injurious influences of various kinds, and in consequence is frequently the subject of pathologic changes, it nevertheless appears that reflex disturbances are comparatively rare. It has been supposed that on account of the resistance of the nerves to the pathologic irritant, the local changes are not as a rule capable of exerting the necessary stimulus. If, on the other hand, in consequence of local or general nerve weakness, there is also an increased irritability, this favors the transfer of the stimulus to the reflex paths. Thus in addition to the local irritant, another important etiologic factor is required, namely, the increased irritability of the reflex mechanism. The excessive irritability may appear either as a local disturbance or as part of a general neurosis. Sensory stimuli, which are capable of starting reflex neuroses, originate most frequently in the nasal mucous membrane itself. Practically all diseases or abnormities of the nasal and subordinate cavities, however, will come under consideration here, as every pathologic process is capable of irrittaing the sensitive nerves, so that reflex phenomena may be produced in cases where the other conditions are also present.

Reflexes are set up most frequently by mechanical irritation of one kind or another. Hopmann attaches special importance to the transitory swelling of polypi and hypertrophic parts of the turbinated bones, particularly if moreover the nasal lumen is contracted as a result of septum deviation, ridges or spurs. Kjelman has reported two cases in which he believes that epileptiform attacks have been caused by changes in the nasal mucous membrane. The same writer found in the special literature 15 instances in which epileptiform attacks are said to have diminished after intranasal treatment. He also considers as chief causes polypi and hypertrophic turbinated bones, especially swollen lower turbinated bones. Tumors that quite fill the nasal cavity seldom give rise to nasal reflexes. Corpuscular elements, such as dust, smoke and vegetable substances, and in some cases the scent of flowers of various kinds, also play a part. In addition to the nature of the irritant, there is also significance in the power with which it acts. In hyperesthetic patients, however, a minimal irritation will suffice to set up the reflex. It is an interesting fact that cases of atrophic rhinitis, unlike those of hypertrophic catarrh of the mucous membrane, are rarely complicated with reflex neuroses, probably because it is accompanied by degeneration of the nerve fibers.

Traumatic lesions, especially after intranasal operations, also have some significance. Thus Rethi reported cases in which spasm of the glottis and supraorbital neuralgia supervened after cautery and snaring operations. Aronson observed asthmatic attacks after galvanocauterization of nasal polypi. In the literature on the subject, moreover, it is now and again stated that fits of unconsciousness, accompanied by spasms in the upper and lower extremities, can be produced from the nasal mucous membrane. Several of these writings are from an earlier period, before cocain was employed as an anesthetic.

The nasal reflex neuroses originate in the same way as all other reflexes through an irritation of the centripetal nerve fibers in the nasal cavity, i. e., of the first and second branches of the trigeminal or of the olfactory nerve. A few authors have indicated certain zones in the nasal cavity which were said to be especially susceptible to irritation. Hack has pointed out, for instance, as excessively sensitive spots, the anterior part of the lower and middle turbinated bones, while other rhinologists consider the dorsally situated part of the septum as such. In some quarters it is maintained that certain reflex phenomena have certain zones of irritation. Torstenssen, for instance, held that in 400 cases of asthma examined, he had found the place of irritation localized to the upper part of the septum. The present view, which is based upon clinical and experimental investigations, is generally that any spot on the nasal mucous membrane may serve as the point of origin of reflex neuroses. In this connection it should be mentioned that so renowned a scientist as Killian holds a different view. With his "Normalfadensonde" he has found that the irritation is not felt equally strongly in all places. The most marked sensitiveness is found in the anterior part of the nasal cavity on the tubercles of the septum and on the anterior part of the inferior turbinated bones. The posterior sections of the turbinated bones and the septum are as a rule less sensitive. As a result of numerous investigations, Killian, in company with other writers, points out that the respiratory mucous membrane with normal sensibility does not give rise to reflex neurosis. Certain predisposing conditions are necessary for this; and only when they are present can the neurosis appear.

Instead of classifying the reflex neuroses on an etiologic basis, the grouping, Killian maintains, ought to be carried out on an anatomic and physiologic basis. In the respiratory field, for instance, he distinguishes between an anterior zone that is innervated from the first branch of the trigeminal, through the anterior ethmoidal nerve, and a posterior zone, supplied from the second branch of the trigeminal, through the posterior, superior and inferior nasal branches coming from the sphenopalatine ganglion. With regard to these two parts, the ethmoidal and the sphenoidal, the cases are not similar. Killian therefore divides the reflex neuroses into two groups, the anterior or ethmoidal, and the posterior or sphenoidal neuroses. The ethmoidal neuroses are the more frequent, as the anterior portion of the nasal mucous membrane is especially exposed to irritants. As a consequence of this, hyperesthesia will be most easily developed here, particularly in the previously mentioned four more sensitive places. Three degrees of the reflex action may be distinguished, (1) the local, which is confined to the region of the nasal cavity itself, (2) the regional, which may also appear in other parts of the trigeminal field, and (3) the widespread reflexes, which encroach upon other nerve areas. The local and regional reflex phenomena make their appearance within the area of the first branch of the trigeminal and especially in the region of the ethmoidal nerves. In irritable conditions of the ethmoidal part of the nasal mucous membrane therefore, itching is observed not only at the irritated spot, but also in the inner canthus, in the median part of the eyelid, in the caruncula lachrymalis, and in the conjunctiva, without these parts themselves being hyperesthetic. The conjunctiva bulbi can be seen to be hyperemic with increased secretion. Even photophobia may occur from intense irritation of the long ciliary nerves. There is also hyperemia of the skin and the ala of the nose, and not infrequently a feeling of weight is experienced in the region of the forehead, with pain in the frontal sinuses (ethmoidal nerve). In addition to these symptoms, Killian states further that distant phenomena in the form of "nasal cough" and nasal asthma in connection with vasomotor rhinitis and hay fever, may occur as a consequence of the ethmoidal irritation. The sneeze reflex is also an ordinary reflex phenomenon in these conditions of irritation. The anterior ethmoidal nerve has been indicated by Sandmann as the most important "sneeze nerve."

With regard to the sphenoidal neurosis, too, the anatomic conditions must be kept clearly in view. The dorsally situated parts of the nasal cavity and adjacent parts of the pharynx are furnished, as we know, with sensory nerves from the sphenopalatine ganglion. The relation of the nerves to the sphenopalatine ganglion is important. Some of the nerve fibres pass through the ganglion while others go past it. In both cases, however, ganglion fibers are taken up. The ganglion itself must be regarded, according to von Lenhossek's investigations, as a sympathetic ganglion. It is in direct communication, through the deep petrosal nerve, with the sympathetic plexus round the internal carotid. Nerve branches from its multipolar nerve cells follow the sensory nerves to the mucous membrane over the middle and lower turbinated bones and the septum, and end among the epithelial cells of the mucous membrane. As a consequence of this, irritants that attack these parts must, in Killian's opinion, irritate the sympathetic terminal fibres as well as the trigeminus, and thereby produce reflexes that are quite beyond our knowledge. According to Killian, the reflex phenomena produced from the sphenoidal zone are similar in quality to the ethmoidal reflexes.

It will be of special interest to find out the relation of the nasal reflexes to respiration and the action of the heart. We should expect, not least in the case of respiration, to find reflex irritation phenomena, as the centripetal nasal nerves in the service of respiration may be assumed to exert a great influence on the respiratory center. Several writers have subjected this question to a careful examination, and have made series of animal experiments in order to find out how intronasal irritation can influence respiration and heart action.

As early as 1870, Kratschmer had experimented on curarized rabbits. As irritants he employed various kinds of gas and, more especially, tobacco smoke. He arrived at the following results.

In the animal's organism there is a peculiar reflex connection between the nasal mucous membrane on the one hand and respiration and circulation on the other. The sensory paths of this reflex connection are situated in the trigeminus, the motor paths in those nerves which supply the respiratory muscles and in the vagus. The reflex appears with any irritation of the nasal mucous membrane, especially with that which is produced by various kinds of gas and always manifests itself in an expiration tetanus with expiratory cessation of respiration, accompanied by a closing of the glottis and by slow heart action and increasing pressure of blood in the arteries.

Kratschmer has also made numerous comparative experiments with isolated irritation of the larynx, trachea and lungs. He considers that the reflex from these organs is of no great importance. The above mentioned reflex symptoms are produced from the mucous membrane of the nose and not from the organs below. Reflexes can of course also be started from the larynx, but they behave in a manner different from that described above. The nasal reflexes are set up notwithstanding intracranial section of the olfactory nerve, but do not appear after destruction of the trigeminal. The author considers he has thereby proved that it is the trigeminal that represents the sensory part of the reflex arc. The motor paths are situated as regards respiration in those nerves which supply the respiratory muscles and as regards the heart in the vagus. It is an interesting fact that by electrical irritation of the intraorbital branch of the trigeminal, Kratschmer produces an expiratory cessation of respiration; but this differs from the cessation occasioned by intranasal irritation, in that by the action of the irritant a deep inspiration always occurs first, followed now and then by small, shallow respiratory movements. Electric irritation, moreover, has no effect upon the heartbeats.

Langendorff, too, found that interruptions of respiration came with irritation of the infraorbital branch of the trigeminal, with slight irritation increased breathing activity or cessation in inspiration phase, with stronger irritation expiratory cessation of respiration.

Besides Kratschmer and Langendorff, Holmgren, among others, showed in 1883 that cessation of respiration can be brought about by irritation of the nasal terminal fibres of the trigeminal, and that it is reflex trigeminal action which, for instance, causes respiration to cease in a rabbit that is held under water (Rosenthal-Falk's experiments).

Knoll, who carried out his experiments on unnarcotized rabbits, found, on the application of strong electric irritation to the infraorbital nerve, that there was an expiratory decrease in the frequency of respiration and finally complete cessation in the expiratory phase. A similar effect has also been found by strong pressure on the skin over the infraorbital region. Knoll maintains the view that not only must a connection be assumed between the sensory paths and the respiratory centre, but that there must probably also be a direct connection between the sensory nerves and the spinal centers which supply the respiratory muscles with motor fibers. If this were not the case, it would be difficult to establish the fact that in an animal in which spontaneous respiration ceased with the section of the spinal cord, a single deep inspiration could be called forth by strong electric stimulation of sensory nerves. Irritation of these sensory paths can presumably cause a direct irritation, not only of the respiratory center itself, but also of the spinal centers for the respiratory muscles. This interference of irritants issuing partly from the respiratory center, partly from the spinal centers concerned, may explain the numerous combinations of increased respiratory frequency and depression of the diaphragm found in animal experiments, where now the one, now the other type of respiration prevails. The respiratory center situated in the medulla oblongata, whose rhythmic action is kept up by the constant flow of blood to it, can on the one hand be excited by psychic or sensory stimulants, and on the other hand be inhibited through the influence of certain nerve tracts, e. g. vagus and trigeminus. The impulses that issue from the respiratory center are transmitted to the respiratory center in the spinal cord. It is probable, however, that the respiratory center may also be exposed to irritation directly from the cerebrum, as the respiratory muscles can, as we know, be voluntarily set in activity.

Sandmann has on the whole come to the same conclusion as Kratschmer; but he found that with slight irritation of the nasal mucous membrane, it was not exactly an expiratory tetanus that occurred, but a cessation of breathing in the phase at which it had arrived at the moment when the irritation took place. (Reported from Schmiegelow.)

Sandmann has further carried out experimental investigations with animals, for the purpose of a more minute study of the physiology of the bronchial muscles. He came to the conclusion, inter alia, that an irritation of the nasal mucous membrane in noncurarized animals caused, in addition to expiratory cessation of respiration, a narrowing of the air passages by contraction of the bronchial muscles. In this way the protection of the respiratory organ against injurious influences is increased and at the same time the removal of mucus from alveoli and bronchi is greatly facilitated. By contraction of the ring of smooth muscular fibre with which, according to Kölliker, the entrance to the alveoli is surrounded, the mucus will be detached and will thus be more easily removed from the infundibulum. This author asserts that by his experiments on animals he has supplied a physiologic basis for the nasal asthma so frequently described in clinical reports. Brodie and Dickson also claim to have proved contraction of the bronchial muscles after intranasal irritation upwards and backwards from the septum. Several other writers express themselves in the same way. Lazarus, who, in his experiments on animals, used curarized rabbits, has employed electric and mechanical (flicking) irritation of the posterior part of the septum and the lower turbinated. He gives the following as the positive result of his experiments. Certain irritants of the nasal mucous membrane reduce reflexly the lumen of the bronchi. The centrifugal part of the reflex arc is to be sought in the vagus, as, after the section of this nerve no effect is obtained, while the increase of pressure in the bronchi again occurs on irritation of the peripheral end of the vagus. The diminution of the bronchi is in all probability due to contraction of the bronchial muscles. Independently of Lazarus, a somewhat similar conclusion is arrived at by Francois-Frank.

According to Killian, Grossmann has also shown, by experiments on curarized, artificially breathing animals, that electric and mechanical irritation of the nasal turbinated bones in the region innervated by the second branch of the trigeminal causes considerable functional disturbance both of the heart action and of the respiration. There occurred, for instance, stasis in the pulmonic circulation, increase of the intrathoracic pressure and depression of the diaphragm. The reflexes are supposed to go from the sensory nasal nerves to the central nervous system and thence through the vagi to the heart and lungs and through the phrenic nerves to the respiratory muscles. In noncurarized, spontaneously breathing animals, the irritation caused labored inspiration, which almost led to complete suspension of respiration. The same thing occurred with secton of the two vagi. Grossmann therefore thinks, with Koblanck and Röder, that the reflex must have taken another direction, which Killian believes will be found in the sympathetic system. Möllgaard, in 1910, made minute investigations of the respiratory nervous system in vertebrate animals. He confirms the view held in accordance with physiologic research, that the vagus carries bronchomotor nerves to the lung, but at the same time points out that these are of a sympathetic character, as they are interrupted in the ganglion nodosum.

Upon the basis of the above investigations and others which will not be described at length in this brief survey of the literature, it has been thought that the influence of some of the nasal reflex neuroses upon the respiratory organ may be explained in the following manner, namely, that the centrifugal paths which are irritated through the respiratory center will be found in the spinal accessory for the spasm of the glottis, in the spinal nerves of the expiratory muscles for attacks of sneezing and coughing and in the vagus for asthma. There are still many circumstances, however, that are not explained, this being especially the case with regard to asthma. This disease is indeed generally looked upon as a neurosis due to a spasm either of the bronchial muscles or of the diaphragm. Several writers maintain, however, that the asthmatic attacks are due in the first place to a vasomotor disturbance, a vascular dilatation, or a vascular contraction. The general idea, however, as already indicated, is to emphasize the reflex nature of asthma, to regard it as a neurosis originating in sensory irritation of various organs, among them, very frequently, the nose, whether the centrifugal paths are to be found in the vagus, the phrenic or the sympathetic.

The great number of nervous disturbances in the various organs, phenomena which more or less justifiably have been looked upon as nasal reflex neuroses, will not here be described at length. As regards most of these diseases, e. g. Basedow's disease, epilepsy, muscular cramp, neuralgia, migraine, etc., it cannot, according to Jurasz, be proved with certainty that they stand in a reflex connection with pathologic changes in the nasal mucous membrane. There will be special difficulty in deciding what neuroses originate in the nasal mucous membrane, and yet show their result in other organs. It will be clear that the diagnosis in these cases may present great difficulties when it is to be proved that the disease really has originated through irritation of the nasal mucous membrane and in no other way. As Jurasz has pointed out, the physiologic and pathologic experimental investigations that we know of at present, do not yet form a sufficient foundation for a judgment of the clinical phenomena. We cannot therefore disregard the possibility of the influence of other etiologic factors. It must be remembered that the presence of a nasal affection does not by any means prove that a reflex neurosis of simultaneous occurrence is of nasal origin. Even if an attack answering to the neurosis can be produced by instrumental irritation of the nasal irritation zones, the character of the neurosis is not thereby proved.

In an epileptic, for instance, an irritation of the nasal mucous membrane may start an attack. The irritability in such a patient, however, is increased throughout the sensory sphere of the nervous system, and of course not least in the nasal mucous membrane, which also under normal conditions is easily irritated. Even if in this case there are intranasal changes it is by no means impossible that the epileptoid attacks may be started from some other place. On the other hand it will always be significant if a neuralgia or an asthma is favorably affected by intranasal cocainizing. Here, too, however, it must be borne in mind that locally soothing medicaments like cocain may show a transitory favorable effect, even if the neurosis does not originate in the nasal mucous membrane. The fact that the phenomena disappear after intranasal treatment has been emphasized by many writers as a proof of the nasal origin of the neurosis. This proof, however, is not decisive either; for if the nerve centers are under one kind of irritation, a new irritant may be able to reduce or quite remove this state of irritation (Goltz). Thus the disappearance of sciatica has been observed after cauterization of the lobe of the ear, and the cessation of hysterical attacks after cauterization of the clitoris; but no one would on that account think of connecting these organs directly with the nervous phenomena. It will not always do, therefore, to look upon those nervous disturbances which disappear, for instance, after an intranasal galvanocauterization as nasal neuroses.

Suggestion, too, of which the great importance to the functional neuroses is generally recognized, has also undoubtedly played a great part here. This has especially been the case during that period in which a large number of ailments were said to be curable by means of galvanocauterization of the nasal mucous membrane. Jurasz recalls the constant relapses that take place as soon as the effect of the suggestion has passed away. The treatment is therefore not a decisive proof. There are numerous factors moreover that must be taken into account, such as mechanical conditions, disturbances of circulation, etc., which assert themselves in connection with the treatment given. In general a critical judgment of the symptoms in each case will be necessary in order to avoid being thrown quite off the scent.

From this account of the nasal reflex neuroses it will be seen that it is first of all those reflexes which originate in the nasal mucous membrane itself that have been carefully investigated. On the other hand we have little knowledge of the reflex effect that may possibly come from the antrum mucous membrane. Our literature on the subject does, indeed, give accounts of some cases in which the antrum reflex is supposed to have played a part; but these depend only upon suppositions which as yet lack the necessary experimental physiologic basis. If, however, an attempt is to be made to find an explanation of the symptoms which were observed by me and others in connection with antrum puncture and subsequent injection of air or syringing, this basis must be furnished. The laborious road through animal experiments must be trodden; and if the experiments by irritation of the mucous membrane of the antrum succeed in producing phenomena similar to those described in the histories of cases, the problem will have been brought nearer to its solution.

An account will be given in the following pages of a series of experiments on animals and their results.

THE EXPERIMENTS ON ANIMALS.

These were carried out on rabbits, as the rabbit has a comparatively well developed maxillary antrum. It appears generally as an irregular cavity about 1.5 to 2 cm. long, 1 to 1.5 cm. high and from 0.5 to 0.6 cm. wide, which aerates the greater part of the maxilla. The antrum is bounded behind by the orbit and the ethmoturbinate bones and is connected with the nasal cavity by an oval opening from 1 to 2 cm. and about 1 mm. wide, situated at the back of the middle nasal fossa, between the maxillo- and nasoturbinal.

As a rule Belgian rabbits were used, of from 2,500 to 3,000 gm. weight. It was found that the use of smaller animals was impractical, as the small space in their antrum made the experiments difficult. The mode of procedure was as follows. The animal was narcotized in the first experiments with ether, subsequently with subcutaneous injections of urethan in doses of 1 gram of urethan per kilogram of body weight. The narcosis that supervened in the course of from 5 to 10 minutes was considerably quieter after this mode of procedure than after the ether narcosis and was borne well. As soon as the animal was narcotized the carotid on both sides was prepared and laid bare for about 1 centimetre, after which a carotid canula was inserted for the registration of the heart action and the blood pressure. For the measurement and registration of the blood pressure a membrane manometer of the Frank type was employed, its movements being calibrated by the aid of a quicksilver manometer. The respiratory movements were also transferred to the registering apparatus by the aid of a pelotte which was fixed by means of an elastic bandage to the animal's abdomen in the region of the diaphragm. In this way exact control of the pulse and respiration was kept and at the same time the blood pressure could be read at any time during the experiment.

It will be remembered from the cases described that the alarming phenomena in the patients did not appear until after the puncture had been made and in most of the cases in connection with the subsequent injection of air. It was therefore obvious that the same method of procedure should be employed with the animals experimented on, namely, first to puncture the antrum and then see what effect the injection of air would have.

The puncturing of the antrum was performed in the following manner. After the soft parts and the periosteum had been pushed aside, the bony walls in the upper part of the maxillary sinus about 7 mm. below the orbital margin and about 3 to 5 cm. laterally from the median line were perforated with a specially constructed blunt perforator, without injuring the mucous membrane within. After the bone had been perforated in this way, the mucous membrane was pierced with a sharp paracentesis needle, or opened with a fine galvanocautery. A short canula was then inserted, which only just projected into the lumen of the sinus, and which exactly fitted the opening, thus being firmly fixed in the bony wall. For the injection compressed gas was used from cylinders with a regulating valve. With this experimental arrangement the air passed without difficulty into the antrum and out through the ostium maxillare. The injection was done with a pressure of about one atmosphere. It must be remembered, however, that on account of the escape of the air through the maxillary ostium while being injected the pressure in the antrum itself is considerably less than one atmosphere. In order to ascertain this, the following experiment was made. In one of the animals experimented on, two trephine openings were made on the same side. One of these openings was connected with a mercury manometer, and the other with the compressed air receptacle. It proved that the pressure in the cavity did not exceed 200 mm. Hg. By way of comparison it may be stated that the pressure in the antrum in a human being during forced expiration through one-half of the nose may rise to about 120 mm. Hg. If the antrum, through an opening in the alveolus, is connected with a mercury manometer, this can be easily ascertained.

At first the animals were not tracheotomized. It appeared, however, that the pressure of the air through the ostium maxillare was also transmitted down through the trachea. In subsequent experiments, therefore, a closed canula, airtight towards the cavity of the mouth, was inserted in the trachea, so that all passage of air to the lungs was impossible.

Several of the earlier experiments with animals must be left out of consideration on account of one particular defect in the experiment arrangements, which will be mentioned more fully later on. Only those experiments that were considered to be quite perfect will be mentioned here.

Experiment No. 1.

Rabbit's weight 2,500 grams.

Urethan narcosis with subcutaneous injection of 2 grams. urethan. Antrum canula in left maxillary sinus. Blood pressure at beginning of experiment 99 mm. Hg. Frequency of respiration 24 per minute. Strong and regular respiratory movements. Air was introduced into the antrum 19 times under a pressure of one atmosphere. In the first seven injections, the animal was not tracheotomized.

1. Injection of air during 7 sec. Irregular and superficial respiration and trifling lowering of blood pressure. Pause of 40 sec. Normal respiration and blood pressure of 99 mm. Hg.

2. Injection of air during 7 sec. Cessation of respiration in inspiration phase with two small irregular respiratory movements. Distinct lowering of blood pressure. Pause of 2 min. Regular respiration and blood pressure of 99 mm. Hg.

3. Injection of air during 14 sec. Complete cessation of respiration and lowering of blood pressure for corresponding period of time. A single respiratory movement during the injection was accompanied by a rise in the blood pressure. Pause of 24 sec. Respiration strong, although somewhat slower than before, four in 10 sec.

4—8. Injection of air during four short periods with corresponding irregular, suspended respiration and lowering of blood pressure. Every lowering of blood pressure was followed by a rise as soon as the current of air ceased to flow. Pause of 3 to 4 min. during which tracheotomy was performed and a closed trachea canula inserted. The respiration, which before the tracheotomy was as strong and regular as at the beginning of the experiment, after the opening of the trachea became somewhat irregular and rapid, six in 10 sec.

9. Injection of air during 15 sec. Three small, irregular respiratory movements mollowed by 10 sec. expiratory cessation of respiration. Pause of 65 sec. Respiration strong, at first somewhat slow, but during the latter part of the pause of normal frequency, five in 10 sec.

11. Injection of air during 10 sec. Absolute expiratory cessation of respiration for 8 sec. and then one shallow respiratory movement. Pause of 25 sec. Strong, regular respiration.

12. Injection of air during 20 sec. Shallow respiration, but no cessation. Pause of 30 sec. Strong, quiet respiration.

13. Injection of air during 15 sec. Shallow, somewhat slow respiration, but no cessation. Pause of 40 sec. Respiration strong and quiet.

14. Injection of air during 16 sec. Expiratory cessation of respiration, and three slow, shallow respiratory movements. Pause of 32 sec. Quiet, strong respiration.

15 to 18. Injection of air during four successive periods, each of 3 seconds' duration, with corresponding irregular, shallow respiration. Pause of 23 sec. Strong, quiet respiration.

19. Injection of air during 7 sec. Four slight, irregular respiratory movements. Pause of 56 sec. Quiet, strong respiration.

20. Injection of air during 15 sec. Respiratory movements somewhat shallow, with decreasing frequency, four instead of six in 10 seconds.

The canula was finally transferred to the trephine opening in the right antrum, where the perforation of the bone had caused bleeding from the mucous membrane. As soon as the pressure was applied, general spasms ensued and death.

The body was dissected immediately after death had taken place. After all the trunk vessels from and to the heart had been ligatured, the heart was first examined. It then appeared that air bubbles were visible through the wall in the right antrum and ventricle. The heart was opened under water in order that the air bubbles might be more easily seen. The right auricle and ventricle were found full of air bubbles and frothy blood, while on the other hand no air was to be found in the left half of the heart. The cranium was then opened and the cerebral matter examined under water. No air bubbles could be discovered. In the other organs there was nothing special to be noticed.

In this experiment a comparison of the respiration and pulse curves before and after tracheotomy is of particular interest. The respiratory movements, especially during the first half minute after the opening of the trachea, are irregular and shallower than before tracheotomy. It is not long, however, before the animal adapts itself to the new conditions, and the breathing once more becomes regular and strong, although the summits in the respective curves are not so high as during the first part of the experiment. It is further noticeable how different is the effect of the injection of air into the antrum before and after the opening of the trachea. Before tracheotomy the cessation of respiration occurs in the inspiration phase, accompanied every time by a marked lowering of the blood pressure. After tracheotomy there is also, it is true, cessation of respiration, but of quite a different character. It is then really an expiratory cessation of respiration, and this is not accompanied by a lowering of the blood pressure. The blood pressure remains throughout at from 95 to 100 mm. Hg., quite independently of the effect of the air on the antrum.

How then are the cessation of respiration and lowering of blood pressure in the non-tracheotomized animal to be explained? In order to find out, the following experiment was made. A T-canula was placed in the trachea and connected with a water-manometer. It then appeared that the pressure of the air in the trachea, which, during quiet respiration, answered to 2 to 3 cm. water, rose, during the injection of air into the antrum with a pressure of one atmosphere, to from 12 to 14 cm. water. There is thus an increase of pressure of about 10 cm. water, a pressure that is sufficiently great to inflate the lung alveoli in the rabbit, so that a cessation of respiration ensues. The inflation of the lung alveoli with the consequent compression of their blood vessls will be followed by an immediate lowering of blood pressure. In order to test the correctness of this experiment, a closed bent canula was inserted above the T-canula, and through it air was injected with constantly increasing force, until cessation of respiration and lowering of blood pressure occurred. The smallest air pressure required to obtain this result answered to from 10 to 12 cm. water, a pressure that was read off in the first experiment. It will be seen from these two experiments that the current of air through the ostium maxillare does not only move forwards out through the nostrils, but also backwards down through the trachea, and that the pressure of air here is sufficiently great to cause a cessation of respiration. In all the subsequent experiments with injection of air, therefore, the animals were trcheotomized with closed canula.

Even after tracheotomy was performed, however, it appeared that every injection of air into the antrum distinctly affected the respiration. Four out of the twelve antrum injections with closed tracheal cannula caused absolute expiratory cessation of respiration. The eight other injections were not, it is true, followed by absolute cessation of respiration, but the effect on the breathing was nevertheless marked. It was shown that the respiratory movements with the last three injections of air, although they do not cease, are yet undoubtedly affected. They become irregular and shallow.

Experiment No. 2.

Rabbit's weight 3,000 grams.

Urethan narcosis by subcutaneous injection of ·3 grams urethan. Tracheotomy with closed tracheal canula. The antrum canula in left maxillary sinus. Blood pressure 96 mm. Hg. Respiratory frequency 30 per minute. Respiratory movements regular and strong. Air was introduced 10 times into the maxillary sinus with a pressure of one atmosphere and gave the following results.

1. Injection of air during 10 sec. Slow, shallow respiratory movements. Pause of 15 sec. Respiration considerably stronger.

2. Injection of air during 8 sec. Absolute expiratory cessation of respiration for the same period. The cessation of respiration terminated with a convulsive respiratory movement. Pause of 42 sec. Quiet, strong, but rather slow respiration.

3. Injection of air during 10 sec. Absolute expiratory cessation of respiration for that period, followed by two convulsive respiratory movements. Pause of 20 sec. Strong, quiet, but somewhat slow respiration.

4. Injection of air during 30 secs. Absolute expiratory cessation of respiration for 13 sec., and then one convulsive and three irregular respiratory movements followed by 10 sec. of absolute expiratory cessation of respiration. Pause of 16 sec. Strong, somewhat slow respiration.

5. Injection of air during 19 sec. A convulsive respiratory movements. Pause of 10 sec. Strong, quiet respiratory movement the instant the pressure was applied, and then shallow respiratory movements. Pause of 64 sec. Respiration during the first part of the pause somewhat irregular, but gradually becoming strong and regular.

6. Injection of air during 18 sec. One convulsive respiratory movement followed by feeble, irregular respiration. Pause of 62 sec. Strong, regular respiration.

7. Injection of air during 12 sec. Absolute expiratory cessation of respiration for 5 sec., followed by shallow respiratory movements. Pause of 10 sec. Strong, quiet respiration.

8. Injection of air during 10 sec. Absolute cessation of respiration during that period. Pause of 60 sec. Respiration irregular and somewhat suspended.

9. Injection of air during 10 sec. Absolute expiratory cessation of respiration during that period. Pause of 60 sec. Respiration somewhat irregular and suspended.

10. Injection of air during 12 sec. Absolute expiratory cessation of respiration during that period, followed by several convulsive respiratory movements. Pause of 3 min. Bad, irregular respiration. Several intervals with entire cessation of respiration. In the latter part of the pause, however, the condition somewhat improved, the respiratory movements becoming more regular although weaker than before. The canula was now transferred to the other side, where a little bleeding had occurred during the trephining, in consequence of lesion and possible detachment of the antrum mucous membrane. Air emboli were therefore to be expected here, and the instant the current of air was turned on, respiratory spasms did occur with general clonic movements in the muscles of the face and extremities, and the animal died in the course of a few seconds. Autopsy showed the same results as

in the first animal experiment, namely, air bubbles and frothy blood in the right antrum and ventricle, but on the other hand air was not visible in the left half of the heart.

A complete survey of the experiment shows the following results. The animal was of sound constitution, with strong, regular respiration and relatively high blood pressure, 96 mm. Hg. Each injection of air is shown in the curve. As a rule, in seven out of ten cases, absolute expiratory cessation of respiration was caused, lasting, in most instances, as long as the pressure in the antrum was kept up, and being finally succeeded by one or two convulsive respiratory movements, or the respiratory movements continue unchanged, quiet and regular, as soon as the pressure ceased. Three times there was no cessation of respiration. As the pressure was applied, a single convulsive respiration was observed, followed by one or more shallow respiratory movements, after which although the irritant continued to act, the respiration went on quietly without being further affected.

While thus the injection of air exerted an undoubted influence on the respiration, it does not appear to have the slightest effect on the action of the heart. The pulse curve remains throughout quite unchanged. This is also the case with the blood pressure, which was measured at about 95 mm. Hg. as long as the experiment lasted.

Experiment No. 3.

Weight of rabbit 2,500 grams.

Urethan narcosis with subcutaneous injection of 2 grams. urethan. Tracheotomy with closed canula. General condition of the animal good, with respiratory frequency of 48 per minute, and blood pressure of 100 to 110. The pulse curves, during the greater part of this experiment, could not unfortunately be registered, as the blood in the right carotid, notwithstanding every precaution, repeatedly coagulated.

1. Injection of air during 14 sec. One convulsive respiration, followed by expiratory cessation of respiration for 20 sec. only broken by a couple of irregular respiratory movements. Pause of 20 sec. Strong, regular respiration.

2. Injection of air during 14 sec. Three irregular, slow respiratory movements. Pause of 53 sec. Strong, somewhat irregular respiration.

3. Injection of air during 14 sec. One convulsive respiration followed by absolute expiratory cessation of respiration. Pause of 48 sec. Strong, somewhat irregular respiration.

4. Injection of air during 14 sec. One convulsive respiration, followed by absolute expiratory cessation of respiration. Pause of 30 sec. Strong, quiet respiration.

5. Injection of air during 16 sec. Absolute expiratory cessation of respiration during that period. Pause of 27 sec. Quiet, strong respiration.

6. Injection of air during 17 sec. Expiratory cessation of respiration and irregular respiration. Pause of 25 sec. Quiet, strong respiration.

7. Injection of air during 12 sec. Expiratory cessation of respiration and irregular respiration. Pause of 20 sec. Strong, quiet respiration.

8. Injection of air during 8 sec. One quick, convulsive respiratory movement, followed by shallow respiration Pause of 18 sec. Quiet, strong respiration.

9. Injection of air during 8 sec. One quick, convlusive respiratory movement, followed by expiratory respiration. Pause of 12 sec. Quiet, strong respiration.

10. Injection of air during 5 sec. One quick respiratory movement with expiratory cessation of respiration. Pause of 28 sec. Quiet, strong respiration.

11. Injection of air during 2 sec. One quick, convulsive respiratory movement, followed by a brief cessation of respiration. Pause of 1 1/2 min. Respiration somewhat irregular, as the animal was coming to, for which reason ether narcosis.

12 and 13. Injection of air during 1 sec. and, after renewed pause of 60 sec., 20 sec., gives the same result as before, namely, convulsive respiration and expiratory cessation of respiration.

As the general condition of the animal was very satisfactory, another series of experiments was also made: but these will not be described here, as their arrangement did not prove to be sufficiently satisfactory. The experiments were subsequently repeated with the necessary precautions, and will be described in detail under Experiment No. 4.

In this rabbit, as in the first two experiments with animals, all the injections of air brought about disturbances in respiration. In nine out of thirteen times, the instant the pressure was exerted there was a very rapid respiratory movement, in which the inspiration and expiration followed one another so closely that the curve summit showed only as a perpendicular line. Immediately after there was a cessation of respiration of an expiratory type, and therefore designated as expiratory. In some instances the respiration ceased before the expiratory phase is completed. This suspension of respiration either continued as long as the pressure was kept up, or was finally succeeded, notwithstanding continued injection, by irregular, shallow, slow respiratory movements. Three times there was cessation of respiration without previous forced inspiration.

A complete survey of all the injections of air shows the following: The injection is followed every time by more or less pronounced respiratory disturbances. These are of various kinds. (1) One forced inspiration occurs, followed by one or more superficial respiratory movements. (2) The respiratory movements become slow and irregular. (3) Expiratory cessation of respiration ensues (24 out of 35 times). This cessation of respiration, which may be prefaced or concluded by one or two convulsive respiratory movements, continues without interruption as long as the irritation operates, or it may be succeeded by small, irregular respiratory movements. The irritation caused by the injection of air has no serious consequences for the animal. If the injection is continued for a sufficiently long time, the respiration begins once more, notwithstanding the continued pressure. The pulse does not seem to be affected in any way.

In the experiments hitherto described, air in the form of nitrogen gas has been used as the irritant. This mode of procedure has been adopted because, acting on clinical experience, it was natural to try the effect of a strong air pressure in the antrum upon the animal experimented with. It is evident, however, that the mode of procedure adopted has its weak point simply because we do not know with certainly whence the reflex comes. The air is injected into the antrum, but issues thence through the ostium maxillare and distributes itself over large areas of mucous membrane both inside and outside the nose, areas which may be the origin of reflexes. It appears, however, from Kratschmer's investigations, that the expiratory cessation of respiration through the employment of gaseous irritants is started intranasally, and not from the lower down in the respiratory tract. The lower parts of the tracheal mucous membrane do not come under consideration here, as the animals were tracheotomized and the trachea firmly attached by ligature to the T-canula, so that all further advance of the air was precluded. It is therefore allowable to take for granted that it is an intranasal and not an extranasal reflex activity with which we here have to do. The question then is, from what part of the intranasal trigeminal region has the irritative effect issued? On this point we cannot, indeed, find out anything certain from the experiments up to the present reported. What we do know is that the atmospheric pressure in the antrum has been measured at 200 mm. Hg., while the pressure in the trachea has fallen right down to 12 centimeters water. We should therefore be able to take for granted that also the pressure in the nasal cavity itself is far less than within the antrum. It is in the antrum that the pressure has acted with its full force, and it is therefore probable that the reflex has come from the part of the trigeminal that is situated there.

Any doubt as to the possibility of reflex respiratory disturbances being set up from the mucous membrane of the antrum will disappear, however, from the result of the last animal experiment, which above all forms the foundation of the experimental part of this work.

It will be remembered that the clinical experience upon which the animal experiments were based was all connected with the treatment of diseased antra. In the experiments, however, we have had to do only with healthy antra. When we consider how very much more sensitive the inflamed mucous membrane of the antrum is than when in its normal condition, we must be justified in attributing a certain importance to this circumstance. Nor can we altogether ignore the fact that the animals were narcotized and therefore without feeling of pain. Knoll, who has experimented on animals both with and without narcotics, maintains, indeed, that the reflex action is the same. He has found no fundamental difference, but the simultaneous effect of the sensitive "Erregungen auf die Psyche" seems to condition an increase in the reflexes from the respiration when the animal is not narcotized. The factors mentioned both go to show that other, possibly stronger stimuli should be tried, stimuli which, unlike the air injected, only exerted their irritative effect where they were applied. There is also another circumstance which should be mentioned in this connection. In going through the literature it was stated that some scientists have produced an effect upon the respiration by irritation of the nasal mucous membrane itself, an effect that in most cases manifested itself as an expiratory cessation of respiration. Thus far my results agree very well with earlier experiences; but when it comes to the reflex effect on the heart action it is a different matter. Here most writers have found marked vagus effect. During the injection of air, on the contrary, the heart's action, as already mentioned, did not appear to be affected. In any case the pulse curve shows no change, no sign of vagus effect. The blood pressure also remains unchanged. It might be imagined, however, that a specially powerful stimulation of the sensory trigeminal fibres in the antrum might also manifest itself as influencing the heart action in the direction indicated by earlier writers.

In accordance with what has here been pointed out, experiments were made with chemical stimuli, alcohol, ether and tincture of iodin. All these substances have in common the unfortunate property of destroying the mucous membrane, and thus making further experiments impossible. The application of these stimuli in the maxillary antrum is, however, easy and rapid in performance. They were nevertheless chosen. As there was an a priori reason for taking for granted that they would be capable of exerting an especially powerful irritative effect, and that this effect would presumably originate in the place of application.

Experiment No. 4.

Weight of rabbit, 2,100 grams.

Urethan narcosis 2 grams. Closed canula in the trachea, and antrum cannula in both maxillary antra. General condition of the animal excellent, with blood pressure of 130 mm. Hg. Respiration rather rapid, 48 per minute, but strong and regular throughout the experiment. 96 per cent of alcohol and ether alternately was used as stimulus, 1/10 of a Pravaz syringe each time.

Alcohol in the right maxillary antrum produces instantly a violent reaction. There was first an absolute cessation of respiration for eight seconds, only interrupted by one convulsive inspiration, and then complete respiratory tetanus with a long series of convulsive respiratory movements, which did not cease until 35 seconds had elapsed. During the brief absolute cessation of respiration which concluded the irregular respiratory movements, the death of the animal was momentarily expected. This expectation, however, proved to be wrong. Respiration soon started again, and with as regular and strong respiratory movements as before the application of the irritant in the maxillary sinus. It was very interesting to find that during the respiratory paralysis there also occurred general paralysis with violent jerks in all the extremities and in the muscles of the face.

Of no less interest is a study of the blood pressure and the pulse curve after the alcohol injection. Whereas, the blood pressure, in all the previous experiments with injection of air, had remained unchanged and quite unaffected by the respiratory disturbances, this time we find a tremendous increase in the pressure of the blood, rising from 130 to 179 mm. Hg., an increase of 49 mm. Hg. The blood pressure remained high all through the respiratory spasm, but showed a somewhat falling tendency, so that when the respiration began once more, it was measured at 155 mm. Hg. The pulse curve, too, changed considerably after the alcohol injection. The pulse beats at first became slower, then small and irregular, and finally, during the greatest rise in the blood pressure, seemed to disappear altogether. During the spasms the pulse curve appeared as an almost straight line; but as soon as the convulsive stage was past and the respiration starts again, the pulse beats were once more seen in the curve, which acquired the same appearance as it had before the injection.

Throughout the pause of about two minutes which followed the alcohol injection, the respiration was strong and regular. The blood pressure remained relatively high, but fell by degrees to 142 mm. Hg. Alcohol was then injected into the left nasal cavity. In order to avoid injuring the mucous membrane in the vestibule of the nose, which in the rabbit is very narrow, the nozzle of the springe was carefully guided 1 cm. into the nasal cavity, where the injection was made. Irregular respiration immediately began, but did not last more than three or four seconds, and did not seem to affect the animal in any way. After a few seconds the respiration continued quiet and strong as before. The rise in the blood pressure, however, which occurs immediately after the ether injection, is worthy of remark. The pressure rises from 142 to 166 mm. Hg., an increase of 18 mm. Hg. The blood pressure remains at this height for 28 seconds, and then falls again to 152 mm. Hg. On this occasion, too, the pulse curve loses its usual appearance and shows as an almost straight line.

After a pause of two minutes with quiet, strong respiration and a blood pressure which measured, at the end of the pause 123 mm. Hg., ether was applied to the left antrum.* Expiratory cessation of respiration for five seconds immediately occurred, and a rise in the blood pressure of 14 mm. Hg., from 123 to 137 mm. Hg. During the subsequent 1½ minute's pause the respiration again became strong and irregular. The blood pressure measured 134 mm. Hg.

Ether in the right nasal cavity produced a convulsive respiratory movement, but did not affect the blood pressure.

After a pause of 50 and 60 seconds, ether and alcohol were again injected respectively into the right and left antrum, without appearing to affect the respiratory movements or the blood pressure in any way. The respiration continued unchanged, strong and regular, and the blood pressure was measured at 130 mm. Hg. until the experiments were discontinued.

The fact that the antrum mucous membrane did not react for stimuli after the first experiments is probably to be accounted for by the destruction of the ends of the nerves in the epithelium of the mucous membrane by the alcohol and ether injections.

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*The small quantity of ether can be supposed to be evaporated after having been injected into the warm antrum. It is therefore possible, that there has been a more or less pronounced refrigeration, which cannot be compared to the strong irritation, caused by the alcohol.

In contrast with the first three experiments with animals, chemical stimuli have here been employed, namely, alcohol and ether. These were applied in the antrum and nasal cavity in the following order: (1) Alcohol in the right antrum, (2) alcohol in the left nasal cavity, (3) ether in the left antrum, (4) ether in the right nasal cavity, (5) ether in the right antrum, (6) alcohol in the left antrum. The experiments show that in this rabbit alcohol produced the more violent reaction and that the reactive effect was very much more pronounced with the application of the stimulus to the antrum than with injection into the nasal cavity; but also with the latter mode of procedure the effect, especially on the blood pressure, was indubitable. On the other hand, the reaction after the ether injection was not very marked, no change being found, for instance, in the blood pressure.

In this animal, as in the others, death was caused by air emboli when the air was injected between the antrum mucous membrane and the underlying bony wall.

For purposes of control, alcohol and ether were dropped into the antrum of another rabbit. The experiment will not, however, be reported in detail, because, among other reasons, the blood in the carotid canula coagulated, and therefore the pulse and the blood pressure could not be registered. I will only emphasize the fact that the effect on the respiration was pronounced (cessation of respiration), although of not nearly so violent a character as described above after the application of alcohol to the right antrum.

The four animal experiments here described, which should be viewed from one standpoint as a collected whole, will be sufficient to prove that by irritation of the mucous membrane of the antrum in the rabbit disturbances in respiration and blood pressure can be produced. These, however, are not dangerous for the animal when only injections of air are employed as stimulus; but if stronger stimuli, such as alcohol, are used, alarming phenomena will appear. In addition to the most violent disturbances in the respiration, tonic and clonic spasms may occur in the muscles of the face and extremities, and also a marked rise in the blood pressure.

The question now arises, how are these symptoms to be explained anatomically and physiologically?

The anatomic conditions which especially come under consideration in the intranasal neuroses will first be briefly mentioned. Figs. I and II. The maxillary antrum, as we know, receives its sensory innervation from the superior alveolar nerves, branches from the infraorbital nerve, which is one of the main stems of the second division of the trigeminal. This divides in the sphenomaxillary fossa into the infraorbital nerve and some other branches, of which the sphenopalatine nerves will be of special interest in this connection, for the sphenopalatines represent the sensory roots of the sphenopalatine ganglion, which is regarded by anatomists as a sympathetic ganglion, and is in direct connection with the plexus of sympathetic nerves round the internal carotid.

When it is a question of find out the way or ways that an irritation of the alveolar nerves may be supposed to take, attention must not only be directed to the principal way through the second branch of the trigeminal to the ganglion semilunare and on to the brain, but must also be turned to the nerve tracts to the sphenopalatine ganglion and the sympathetic system.

If the first way is followed, to the ganglion semilunare, where the cells of the sensory trigeminal fibers are situated, the following anatomic conditions must be kept in view. From the sensory trigeminal cells in the ganglion semilunare run centripetal filaments, sensory fibers of the first order, through the portio major into the brain. Here the fibers divide in the form of a T into a short ascending and a long descending branch. The descending branches form the socalled spinal tract of the fifth nerve. It runs right down to the upper part of the cervical spinal cord. In their course both the ascending and the descending branches send out numerous collaterals, which wind round the nerve cells grouped together upon their median side. These cells form in the pons a large nucleus, the socalled sensory muscles of the fifth nerve; caudally they form the previously mentioned nucleus of the spinal tract of the fifth nerve. From these nerve cells issue the sensory fibers of the second order, the nerve offshoots that form the great quintothalamic tract, and which end in the thalamus, where the sensory neuroses of the third order running to the cortex have their origin. In what relation, then, do these sensory offshoots from the trigeminal nucleus stand to the respiratory center?

The earliest idea, that the respiratory center, "neud vital," formed an asymmetrical center in the posterior angle of the calamus scriptorius, has now been abandoned, but its position in the medulla oblongata has not yet been established with certainty.

While some scientists place it in the reticular substance, especially the lateral gray reticular substance, others are of opinion that it is to be found in the ala cinerea area, or in the dorsal vagus nucleus and the nucleus of the solitary tract, situated in the floor of the fourth ventricle.

Great confusion has also prevailed regarding the course of the tracts that connect the respiratory center in the medulla oblongata with the motor nuclei for the nerves of the respiratory muscles, especially the phrenic nucleus and the nuclei of the intercostal nerves in the spinal medulla.

The most important recent work on this last subject is by Max Rothmann ("Ueber die spinalen Athmungsbahnen." *Arch. f. Anatomie u. Physiologie, Physiolog. Abteil,* Jahrg., 1902).

According to Rothmann, the involuntary respiratory center is to be found in the medulla oblongata in the gray reticular substance. The tracts for the innervation of the diaphragm run almost exclusively through the ventral part of the lateral column, and those for the thorax muscles (intercostal muscles) principally through the lateral part of the anterior column. After the destruction of the reticular substance in the medulla oblongata, these tracts appear to degenerate. Some of them are crossed, some are not. An irritation of the respiratory center will be transmitted through these tracts to the phrenic center and the intercostal nerve centers in the spinal cord, and bring about a contraction of the diaphragm and of the intercostal muscles.

The diagram (Fig. I) shows how near, in the topographic sense, the sensory trigeminal nerves are to the respiratory center. We can imagine an irritation of the trigeminal tracts transmitted to the respiratory center in one of two ways, either by a direct radiation of collaterals from the spinal tract into the respiratory center (reticular substance), or the connection may be more complicated—e. g., the nerve offshoots that issue from the cells in the nucleus of the spinal tract of the fifth nerve, and run upwards to the thalamus, may throw out collaterals to the reticular substance.

It would appear from the above that respiratory disturbances, regarded from an anatomic point of view, may very well be produced by the transmission of an irritation from the trigeminal to the involuntary respiratory center in the medulla oblongata, and thence to the respiratory muscles. What in this instance makes the matter more complicated is, however, that in one of the animals experimented upon, not only were respiratory disturbances proved to occur, but also, in connection with them, general spasms of the muscles of the face and extremities, together with a tremendous rise in the blood pressure.

As collaterals run from the fibers in the quintothalamic tract to the nucleus of the facial nerve, and also, according to the general belief, the reticular substance is united by connecting fibers to the adjacent nucleus of the facial nerve, it will be easily understood that an irritation of the terminal branches of the trigeminal may also cause spasms of the muscles of the face. The fact that the muscles of the extremities were likewise affected seems, however, to indicate that the stimulus, at any rate in this instance, has passed by the quintothalamic tract to the thalamus and thence onwards to the cortical substance, and that it is there, in the brain cortex, that the irritation has attacked the adjacent centers.

It will be remembered that during the injections of air the pulse curve did not show the slightest indication of change in any direction. On the employment of chemical stimuli, on the other hand, especially after the alcohol injection into the right antrum, a tremendous rise in the blood pressure immediately occurred. At the same time the pulse became first slow, then small and irregular, and finally, when the rise in the pressure had reached its maximum, almost entirely disappeared, so that the pulse curve only looks like a slightly undulating line in which the separate pulse beats can only just be distinguished. Very much the same reaction, although not so strong, is also found after an alcohol injection in the left nasal cavity. The great increase in the blood pressure can only be accounted for in two ways, either by an increase in the work of the heart or by an increased resistance in the circulation. In the first case, the increased heart action throughout the rise in the blood pressure would manifest itself in the pulse curve by strong heart beats and high summits. It appears, however, from the above that this is far from being the case; indeed, the pulse beats in the curve are at last seen almost to disappear. The great rise in the blood pressure therefore cannot well be due to the increased heart activity.

It seems natural, then, to explain the rise in the blood pressure in the second way, namely, as the consequence of an increased resistance which the heart can at first overcome, but which at last becomes so strong that the heart is no longer able to continue its work with such force as to mark the systole in the greatly overfilled arteries, and in consequence the contractions of the heart are no longer recorded in the pulse curve, which appears as an almost straight line. The question now is: How is this increased resistance to be explained in connection with the other reflex phenomena?

One would here naturally think of a reflex irritation of the vasoconstrictor nerves. If we try to find an anatomic basis for an explanation of this reflex activity, the following anatomic conditions must not be lost sight of. The trigeminal branches running to the back of the nasal cavity (posterior superior and inferior nasal branches) pass through the sympathetic sphenopalatine ganglion, and, according to von Lenhossek's investigations, send out collaterals which envelope the sympathetic nerve cells in the ganglion. The latter again is in connection with the plexus of sympathetic nerves round the internal carotid. A stimulus that is transmitted through the trigeminal fibers to the ganglion may therefore be supposed to produce a constrictor impulse to the sympathetic plexus round the internal carotid. There seems little reason to suppose that the rise in the blood pressure in the cases before us is due only to a contraction of vessels within the carotid area. The natural explanation would rather appear to be that the irritation from the alveolar nerves has taken the previously mentioned way to the brain cortex, and that it is there that the impulse is transmitted to the vasoconstrictors.

As to how this transmission has taken place it is difficult, with our still imperfect knowledge of the central sympathetic centers and tracts, to express any decided opinion. I will only in this connection point out that according to Tigerstedt there are generally supposed to be two principal centers for the vasoconstrictor nerves. One of these is believed to be situated in the medulla oblongata, where the root fibers of the facial leave the continuation of the spinal cord (Frank), the other within the motor zone of the brain cortex. It thus appears from Weber's experiments that an irritation of the motor sphere in the cortical substance of the cerebrum not only produces ordinary muscle cramp, but is also followed by a distinct effect upon the muscles of the vascular system, the vessels innervated by the splanchnic nerve especially being contracted. Whether there are connecting fibers between the centers mentioned and the adjacent nerve centers in the continuation of the spinal cord, or the brain cortex, is not known as yet. It can only be said that in analogy with the conditions of other adjacent nerve centers where the connection has been anatomically ascertained, it is natural to suppose such connections also between these centers. The experiment before us seems at any rate to favor the idea that a transmission of the stimulus has taken place either in the medulla oblongata, or, as already pointed out, more probably within the motor sphere of the brain cortex around the central sulcus where the chief respiratory center and the motor centers and the vasoconstrictor center are to be found.

It has repeatedly been stated that the majority of investigators have found, after intranasal trigeminal irritation, a marked vagus effect both on respiration and heart action. As, however, in my animal experiments I have never been able to prove a vagus effect on the heart action, I have endeavored anatomically and physiologically to elucidate the phenomena observed, on the basis of the assumption that there has been no vagus irritation. I am, however, fully aware that my explanation of the symptoms is not in all respects entirely satisfactory.

We should have expected, for instance, that if the irritation had taken the course mentioned, through the respiratory center to the intercostal nerves and the phrenic nerve, a contraction of the intercostal muscles and of the diaphragm would have been started, and that this would have resulted in an inspiratory cessation of respiration. We get, on the contrary, an expiratory cessation of respiration, a phenomenon which more particularly favors the idea of an irritation of the bronchomotor vagus fibers. It would be remarkable, however, when we consider the whole origin of the motor vagus fibers to lungs and heart (the visceromotor vagus nucleus), if an irritation which affected the center were to exert its influence only on the bronchomotor fibers. It would seem natural for the irritation to be also transmitted to the heart fibers, with vagus effect on the heart as a consequence. With our present very imperfect knowledge of the central conducting paths and their mutual relations, it will hardly be possible to give an entirely satisfactory explanation of the symptoms before us. Nor can we altogether disregard the possibility that this may have been a combined irritation of various nerve centers, an irrittaion which, owing to conditions unknown to us, in individual cases may act with unequal force upon various centers, and which therefore will give such widely different symptoms that from an anatomic point of view they can hardly be explained.

In connection with the report of the cases it was shown that the sudden and unexpected shock phenomena in the patients might, from a theoretic point of view, as well be ascribed to the anesthetizing as to the operation itself and the subsequent injection of air or syringing. As regards the first alternative it was pointed out that a cocain anesthesia, especially in a nervously disposed patient, who, moreover, owing to the disease, was not very capable of resistance, might well have had significance as a predisposing element, but that the cocain can scarcely have been the decisive factor.

The question then is whether the injection of air or syringing may not have had something to do with the phenomena. To this it may be answered that the symptoms observed during the animal experiments exhibit in a number of points a striking similarity to the phenomena that have been observed both by earlier writers and by myself in connection with antrum punctures. It will be remembered, for instance, that the cessation of respiration was at first the dominant feature in all my cases. There are further the suggestive occurrences from the motor sphere, which were seen in my cases 1 and 2, in the first case general epileptoid convulsions, in the second a spastic condition of cramp in the trunk and extremities. In this connection it should be pointed out that with these patients there was not the slow, hard pulse mentioned by several writers, and supposed to be the expression of a vagus irritation from the trigeminus. In the three patients in whom there was opportunity of observing it, the pulse during the first part of the attack was uncountable, and afterwards small and rapid.

It thus appears that through irritation of even a healthy antrum mucous membrane, reflex conditions of irritation are produced in the rabbit, which greatly resemble the symptoms which, in man, occurred in conjunction with puncture of the antrum. It therefore cannot be denied that with sensitive persons, at any rate, increased air pressure or syringing, for instance with cold water (cf. Killian's case), may act as a sufficiently strong stimulus to the inflamed mucous membrane of an antrum, to set up reflex irritation phenomena of a serious nature. It happens, however, surely very seldom. As a rule, the alarming antrum phenomena will be interpreted in another, more obvious manner.

In the description of the animal experiments it was stated that some of the experiments failed, especially on account of one particular defect in the arrangement of the experiments. It was the defective technic in the perforation of the bony wall of the antrum which here gave trouble. One animal after another died of air emboli and emphysema. In each case autopsy showed the same result. The trocar had, it is true, perforated the bone, but not the mucous membrane, or at any rate not to a sufficient extent. The mucosa was torn away from the periosteum of the bony wall, the small blood vessels between being injured in consequence, and the air forced into the opened veins, with instantaneous death as the result. It was on the whole remarkable how difficult it was to avoid air emboli. With the facts learned from animal experiments, it was natural to enquire into the conditions in man, whther the mucous membrane here, too, could be so loosely attached to its bony substratum that a careful, slow puncture such as must, owing to space conditions, be made in the case of the small animals experimented on, might be attended by the risk of detaching the mucous membrane. It is obvious that in man this complication is not of frequent occurrence. If the antrum picture were generally associated with a loosening of the mucous membrane of the antrum, the unfortunate consequences of this simple operation would undoubtedly be far more frequent than is the case. We see, however, that complications occur but seldom. I have myself, for instance, in a single series of investigations, punctured about 50 antra without one mishap. If, however, we wish to make a comparison between the conditions in the animals experimented on and those in man, care must be taken, as already said, that the puncture is performed in the same manner, and that the trocar is not pushed quickly through the wall, but slowly, little by little. It is, as we know, seldom that an antrum puncture is performed in this manner, but it will occasionally happen that the anatomic conditions prove to be such that the puncturing needle's progress is slow, namely, in those cases in which the bony wall in the lower meatus is so thick, and the bone of so firm a consistency, that it is really not possible to push the trocar through quickly. It is only antra where such conditions exist, that is to say, the small, thick walled ones, that can come under consideration here. Keeping these conditions in view, a series of investigations have been made, some on the dead body, others on patients. The antrum in one of the bodies examined was small, and with so thick a wall that it was only with great difficulty that the needle could be made to pierce it. It appeared that in this case the trocar detached the whole of the median mucous membrane of the antrum from its bony substratum, and pushed it in towards the lateral wall surface of the antrum without perforating the membrane. The mucosa was thick and swollen as a consequence of empyema in the antrum.

In the living subject examination was made during the performance of a radical antrum operation according to Luc-Caldwell. After removal of the facial wall, the light was thrown in towards the median wall of the maxillary antrum, simultaneously with the perforation of the bony wall from the lower meatus. The relation of the mucous membrane to the needle during the operation could be observed with great exactness. In the patients examined the maxillæ were large and the antrum walls easily penetrated. In one of the patients the trocar was quickly and forcibly pushed into the antrum. The mucous membrane was instantly pierced, without any loosening. On the other hand, in another case where the mucosa was thick and swollen, the needle, by way of experiment, was introduced slowly and gradually. It then appeared that the trocar to a large extent detached the mucous membrane from the bone, and pushed it in towards the lumen of the antrum. The mucous membrane was pushed so far in before the perforation took place, that the operator in such a case would certainly take for granted that injection of air and syringing could be performed. It is clear that the result of an injection of air or water in these circumstances might be that the air would be blown into the opened blood vessels between the mucous membrane and the periosteum, and thence carried into the circulation. The question would thus be: What might be the consequences of such an injection of air into the blood? We here enter upon a chapter of medical science in which a considerable amount of uncertainty still appears to prevail.

THE AIR EMBOLUS.

The air embolus, with its dangers, has been the subject of careful research by many writers. It has long been known, for instance, that a forced injection into the veins of an animal may cause death. Harder, as long ago as 1684, injected air into the jugular vein of a dog, which died instantaneously. On dissection, frothy blood was found in the heart. Spontaneous entrance of air during an operation with lesion of the veins was first observed in 1806 by Verrier in a throat operation on a horse. The operative air embolus in a human being was not described until later. In 1824 Dupuytren published an account of one of the best known cases. During a throat operation a sucking kind of noise was suddenly heard and the patient died instantaneously. The postmortem showed air in all blood vessels, especially in the right heart. Since then a number of similar cases have been reported, not only during throat and thorax operations, but also in lesions of the more peripherally situated venous trunks. The clinical description is very much the same. During the entrance of the air there is heard a gurgling, scraping noise, proceeding from the injured vein. Immediately afterwards a peculiar rattling sound is heard over the heart, where the percussion note becomes tympanitic. At the same time there is more or less irregular respiration, sometimes with convulsive, and sometimes with suspended respiratory movements and with irregular heart action. The patient may die instantaneously or after the lapse of some time, not infrequently in convulsions. Now and then the patient recovers without lasting injury. The results of autopsy do not always correspond. Certain investigators, for instance, have found air bubbles only in the right heart and the large venous trunks, while others claim to have found air in all the blood vessels of the body, at the same time maintaining that this air did not originate in the process of putrefaction. Hübl also found air bubbles in the small blood vessels of the spinal cord. All investigators emphasize the fact that it is primarily in the right heart that the accumulation of air is found. The right half of the heart is described by most of them as tightly filled and inflated like a balloon.

Opinions with regard to the cause of death differ greatly. Some consider that it has been a "lung death." The air is driven out by the right heart into the lung capillaries, which are embolized, and the circulation is interrupted with death as the result. It has sometimes been supposed that the air emboli have become fixed in the small blood vessels of the central nervous system, thereby causing a "brain death." Most writers seem to incline, however, to the view that the cause of death should be looked for in a paralysis of the heart and that thus the death as a rule has been a "heart death."

The numerous experiments on animals that have been made in this connection are of great interest, and on several points contribute valuable material towards the understanding of the air embolus and its dangers.

Theodor Jürgensen has made a great many experiments with dogs. They showed, in every case in which the animal did not die instantaneously, that air that was introduced into the right crural artery could be traced in the left crural vein, even after the left crural artery was ligatured and the air bubbles were thus forced to pass through the collateral connecting lines. With inspiration, the air bubbles that could be seen in the vein were sucked up towards the heart, while with expiration they stood still or even moved back a little. After the air injections the respiratory movements were rapid, dyspneic. The respiration curves showed steep summits with large oscillations. When death was approaching the curves were still steep, but irregular and slow. In the case of one of the animals experimented on, 530 cc. was injected in the course of 48 minutes, and in another 2,730 cc. in the course of about 2½ hours, without causing any noticeable changes in respiration and heart action. It was proved that the air bubbles circulated for four or five hours.

There seemed to be no doubt that a rapid separation of the air from the blood took place, as it would otherwise be inconceivable that such large quantities of air should not produce more alarming symptoms than was the case. On dissection of the animals that were killed by rapid injection of large quantities of air, air was found in the arteries. The right heart was full of air and very frothy blood, and there was a considerable amount of blood mixed with large air bubbles in the large veins, while as a rule the left ventricle was almost entirely empty. It seems as if this part of the heart has been sufficiently powerful to expel the comparatively trifling amount of air left after passing through the lungs into the circulation. The writer draws attention, however, to the fact that the condition thus discovered by dissection cannot always be expected to occur. If, for instance, a large quantity of air is injected rapidly, so that the right heart is distended and becomes incapable of emptying its contents into the lungs, or if the air is introduced sufficiently slowly and carefully, there will probably be no free air bubbles to be found in the arterial vascular system. Jürgensen, however, considers it sufficiently proved, by his experiments with animals, that air from the right heart can actually be carried through the lungs to the left, and thence into the circulation.

The cause of death by air emboli is also mentioned by

Jürgensen, whose view is in accordance with that maintained by Couty. The latter writer, who has made a number of investigations of the blood pressure in the large vessels, distinguishes between several different groups of symptoms according to the amount of air injected, and believes that death may be caused in several ways.

1. Entrance of air without general disturbances.

After small quantities of air, a few cubic centimeters at once, or larger quantities introduced little by little through the veins, no general disturbances are seen. If the pressure in the large arteries is measured, it will be found to fall a little. Over the heart, too, a peculiar systolic murmur is heard, arising from the air intermingled blood in the right ventricle of the heart. Respiration is not affected.

2. Entrance of air with cerebral anemia.

It must then be presupposed that a large amount of air enters quickly. The consequence will be a lowering of the pressure in the large arteries (40 to 50 mm. Hg.). The systole becomes weaker, the pulse rapid, respiration frequent. In man the face turns pale and syncope ensues, after which all dangerous symptoms as a rule subside.

3. Entrance of air in large quantities, with disturbances in the circulation, especially with anemia of the brain and medulla oblongata.

In addition to the phenomena mentioned under heading 2, respiration is slow and spasms occur in all the striated muscles. In curarised dogs with opened thorax, a dilatation of the right auricle and ventricle is seen as a consequence of the overflowing with air, also venous reflex with venous pulse even in the smallest veins.

4. Entrance of air with disturbances in circulation, especially in the nervous organs.

These are disturbances that result in death. During a rapid lowering of blood pressure the previously mentioned symptoms appear in an intensified degree.

The physiologic basis is the same in groups 1 and 3. As a consequence of the arterial anemia, the brain is paralyzed in its function, and respiration and heart action cease.

In addition to Jürgensen's work, mention should be made, in this connection, of Ludwig Wolf's experimental studies of air emboli. The last named writer also carried out his experiments on dogs, but as a rule injected the air into the right jugular vein, up to 200 cc. in the course of 45 minutes, in quantities of up to 50 cc. at a time. The animals reacted even with minimal quantities of air in the same way, labored, irregular, intermittent respiration, and irregular but strong pulse. The results of his experiments were as follows: The air introduced into the venous system is quickly conveyed to the right heart, where, even after the injection of minimal quantities of air, a humming sound is heard during compression of the aerated blood by the heart. On the entrance of larger quantities of air, dilatation of the right heart ensues with relative insufficiency and overfilling with air in the large venous trunks. From the right heart the pulmonary artery is filled with bubbles of air, which make their way into the lung capillaries. Beyond this, i. e., in the pulmonary veins and in the chambers of the left heart, Wolf has not been able to prove the presence of air in any great quantity, and maintains that those writers who, after venous emboli, have found air in the entire circulation, have made an error of observation. The air bubbles observed must have originated in processes of decomposition, or in the entrance of air during dissection. Wolf further alleges that the air embolizes the lung vessels, but that the resistance here encountered is overcome by the heart, if at the same time too great a number of capillaries is not blocked. The writer maintains, however, that a few air bubbles may also find their way into the capillaries of the pulmonary veins, and that in this way, through embolizing of blood vessels in the brain and spinal cord, or of the coronary arteries, death may ensue that cannot be called a lung death. He thinks, however, that this is rare. The general cause of death is embolism of the lung capillaries. It is therefore found that the fall of the blood pressure in the aorta is on a parallel with the amount of air injected, while the pressure in the pulmonary artery rises. What has become of the large quantities of air injected in the veins? It is not in the systemic circulation, nor yet in the right heart and the large veins, unless the whole of the pulmonary circulation is suddenly stopped by a great injection of air. The only explanation is that the air has escaped through the lungs. Cohnheim, who is an opposer of the theory of the embolic lung death, emphasizes indeed the fact that an animal can live even if only half of the pulmonary vessels are pervious. Wolf refers, however, to Lichtheim's investigations, which show that three-fourths of the pulmonary circulation must be put out of gear if the pressure in the aorta is to diminish, and points out that in those cases in which death is caused by aspiration of air into the vessels, it is probable that far more than half the vessels are embolized.

A number of investigators, among them Wolf, have proved that in an injection of air into the arterial system the air is carried with the blood through the entire system. Air introduced into the crural artery, for instance, is found as previously mentioned, in the crural vein on the opposite side. Heller, Mager and von Schrötter have also described manège moments, paralyses, loss of consciousness, tetanic cramps, spastic paralysis and paraplegia, symptoms which all point to capillary emboli in the systemic circulation. Autopsy showed hyperemia of the lungs and, contrary to what is found with venous emboli, air throughout the circulation. Similar conditions are also found, as Jürgensen has shown, with air emboli issuing from the ventricle and the abdominal veins. According to Wolf, the case of venous emboli from the abdominal vessels differs somewhat from the usual cases of venous emboli; for as the air passes through the capillaries of the portal system it is liable, just as in its passage through the capillaries of the systemic circulation, to an equally strong pressure from all sides, and is in consequence so finely distributed throughout the blood that it can, to some extent at any rate, make its way through the pulmonary circulation. The large air bubbles, which might possibly form on the way to the lungs, do not appear in such numbers as to cause a simultaneous embolization of large sections of the lung, and thereby bring about serious consequences. The lungs form, on the whole, the organism's most powerful defense against the air that has entered into the blood, as they give to the systemic circulation the protection of a rampart. When once the air bubbles have entered the systemic circulation, the danger of serious complications will be considerably greater. They will then embolize vital vessels, with death as the result.

It will be seen from the investigations that I have carried out for the purpose of ascertaining the condition of the mucous membrane during the trephining of the antrum wall, that a loosening of the mucous membrane in special circumstances may very well be assumed to take place. It will further be remembered that in several of the cases described, it is stated that the antrum wall was thick. This was the case with two of my patients, and I had not the usual well known feeling of the bone suddenly yielding and the trocar gliding into a cavity. The resistance was too strong for this. It was supposed that the bone was punctured because the trocar had penetrated so far that even a very thick antrum wall must have been perforated, and because the point of the cannula could be moved a little in various directions. The air was then injected, and a kind of bubbling sound was heard, which might, however, also have been supposed to be made by the air as it made its way under the bleeding mucous membrane. It is noteworthy that with both these patients there was a certain interval between the injection of the air and the occurrence of the phenomena. In the case of the one patient, for instance, the injection of air had ceased, and it was not until the syringe had been transferred to the water receptacle that the symptoms made their appearance. This also seems to favor the belief that it was a case of embolus. How great a quantity of air may have been forced into the vessels cannot be precisely stated; but with neither of the two patients in question was the ball of the syringe compressed more than twice at the most. As the bulb, when filled to the maximum, does not contain more than about 48 cc., the quantity of air injected cannot have been very great. It will be remembered that Wolf, without serious consequences for the animal, injected as much as 50 cc. at a time; but this, it must be borne in mind, was in one of the main venous trunks, the jugular vein, so that the whole of the 50 cc. was injected into the blood stream. In an antrum puncture, however, the conditions must be quite different. The air does not then make its way into the lumen of a large vein, but is forced into the small veins that are torn away when the mucous membrane is detached from the bone. It is therefore unlikely that any great quantity of air has entered the vascular system. In all probability only a few air bubbles are forced into the circulation, and it is then a question whether these could cause the alarming symptoms. It will be apparent from the investigations mentioned that small quantities of air in the venous system cannot produce dangerous phenomena. These can only occur when the air passes into the arterial circulation. Jürgensen has proved, however, not only that air in the arterial system passes without difficulty through the lung capillaries, but also that air bubbles in the venous system, at any rate from the vena linealis, may pass into the greater circulation. Wolf himself, who is also an ardent defender of the lung death theory, admits that even the venous air embolus may be carried into the arterial system. He points out that the paralyses, clonic and spastic contractions, etc., described by Heller, Mager and von Schrötter, really indicate capillary emboli in the systemic circulation.

If these investigations are compared with my two cases in which there have probably been air emboli, it will be seen that it is first and foremost the arterial embolus of which there can here be any question. The symptoms, at any rate, strongly favor this view. Judging from the animal experiments, the venous emboli produce phenomena first of all from the lungs, heavy, irregular respiration. Otherwise the animals showed an astonishing power of resistance to air in great quantities. There is no doubt that the same conditions may also assert themselves in human beings. The following history of a case will be of some interest in this connection.

A pregnant and very anemic woman of about 30, in the State Hospital ear ward, underwent a right sided mastoid operation, with exposure of the sigmoid sinus, the walls of which appeared to be unusually thin and pulsated strongly. After the bandages had been changed several times, about a fortnight after the operation, the patient was to be moved to the maternity hospital on account of her approaching delivery. As no time was to be lost (the pains had already begun), the dressing was done with all possible speed in the ward. Directly the old bandage was removed, a continuous, long drawn, sucking sound was heard, though this was not at once diagnosed as an air embolus. Immediately after, however, the same sound was heard again, and the patient fell to the ground with loud cries of pain, which was first located over the heart, and directly after over the dorsal surface of the right lung. For a little while the patient was somewhat short of breath, but in a couple of hours was able to be moved to the maternity hospital, where the same day she gave birth to twins and subsequently suffered no inconvenience from her embolus. The sucking of air, in this case, into the sinus only ecased at the moment the patient collapsed. There is no doubt that a considerable quantity of air had been sucked in. The symptoms seem most nearly to resemble Couty's group II. The description of the attack shows that the air could be clinically followed on its way first to the heart and then to the lungs, where its further passage to the systemic circulation seemed to be arrested. It is probable that here the air disappeared from the blood in the following manner. After entering the circulation it is immediately taken up by the hemoglobin, and oxyhemoglobin is formed, whereby the amount of air is reduced 20 per cent. The nitrogen remaining has thus, practically speaking, become pure—that is to say, it has circulated in the blood with a tension of one atmosphere. When this air in the pulmonary veins has begun to mingle by diffusion with air in the pulmonary alveoli, where the tension of the nitrogen is only about four-fifths of an atmosphere, nitrogen is diffused from the air in the veins into the air of the pulmonary alveoli. It will be seen how very widely the features of this case differ from the phenomena that occurred in those of the two antrum patients. In the case of the woman mentioned, there was a large, practically continuous venous air embolus; while in the two antrum patients there was in all probability an arterial air embolus. In the latter cases the small air bubbles must have been able to pass through the lungs and to enter the general circulation, where, by embolizing vital vessels in the central nervous system, they have set up the alarming symptoms.

In reading the history of the cases I have mentioned at the beginning of this work, it will be seen at in addition to my two cases Nos. 1 and 2, air emboli probably also occurred in a number of the other cases described (cf. Claus' Nos. 1 and 4, Neuenborn's, Zarniko's, Fleischer's, Holmgren's and Roll-Hansen's). In most of these cases the bony wall was hard and difficult to penetrate. The symptoms, moreover, occurred in connection with the injection of air.

The assumption of air emboli is applicable to most cases described, but not to all of them. In my patient No. 3, for instance, the wall of the antrum was thin and the cavity very large. The postmortem showed that no detachment of the mucous membrane had taken place. It will, moreover, be noticed that the dangerous phenomena did not always occur in conjunction with the injection of air, but during the actual syringing (Claus' No. 3 and Henrici's Nos. 1 and 2). In Killian's patient, too, the shock came upon syringing with cold water. If the syringing has been undertaken after a loosening of the mucous membrane inside the antrum wall, it may be likely that also in these cases an air embolus has taken place. Whether, in these patients, it has been an antrum reflex or an air embolus with which we have had to do, can of course never be ascertained; but from my experiments with animals it would appear that the possibility of an antrum reflex ought to be given some consideration. When the question of a nasal "embolus or antrum reflex neurosis" is brought forward, we here enter upon a subject of which very little is told in our special literature, but which, in other medical literature, has been thoroughly worked up in another connection.

It is well known that during the puncture of another cavity, namely, the pleural cavity, alarming phenomena of an uncertain, often mysterious character, now and then occur, and it has not yet been decided whether these are due to air emboli or to a reflex from the pleura.

In connection with this question—antrum reflex or air embolus, it will without doubt be interesting to recall the views that have been put forward with regard to the pleural cavity.

It has long been a well known fact that in affections of the pleura various more or less serious phenomena of an unknown nature may occur, sometimes spontaneously, with great exudation or pneumonias, sometimes in connection with operations on the pleura.

Forlanini classes the symptoms under the heads psychic, motor, circulatory and respiratory. The psychic symptoms manifest themselves in loss of consciousness for long or short periods without lasting effects. The motor symptoms present themselves partly as spasms, partly as paralyses, often spasms alone, tonic or clonic, which come on simultaneously with the loss of consciousness, and affect most of the muscles. The spasms are often, though not always, one sided. The paralyses are flaccid, monoplegic or hemiplegic. The symptoms from the circulatory and respiratory systems are paretic with small pulse, slightly cyanotic skin and mucous membranes. The respiration is shallow, even ceasing altogether, so that artificial respiration may be necessary. There have also been a number of cases in which operations on the pleura have even resulted in death.

It is needless to say that these accounts published by Forlanini and other well known writers have attracted much attention and have been the subject of considerable discussion in the special literature. A great difference of opinion prevails, however, among both clinical writers and pathologic anatomists, as to the manner in which the phenomena are to be explained. There are especially two views that are of importance. One of these, the embolus theory, which has its warmest adherents among German medical men, maintains that the above mentioned symptoms and death are due to emboli, above all air emboli, resulting from the lesion of the pulmonary veins with the nozzle of the syringe and the injection of nitrogen into the systemic circulation. The negative result of many of the postmortem examinations is not considered to be unfavorable to the theory of air emboli, partly, because the autopsy was not always done with sufficient exactitude, and partly because the air embolus, after inflicting injury, may have been again absorbed.

The other view, the reflex theory, which has gained ground more especially among French and Italian scientists, maintains that the phenomena described by Forlanini and others must be regarded as a pleural reflex, a pleural eclampsia. By this is understood a shock effect produced reflexly from the pleura, and passing either to the circulatory center and the heart, with a heart death, to the respiratory center with disturbance or cessation of respiration, or to the brain with nervous disturbances, loss of consciousness, spasms and paralyses.

As typical attacks have even been brought on by merely introducing the needle into the pleural cavity without injecting air at all, and as the phenomena are not infrequently transitory, reappearing as soon as the manipulation is repeated, the adherents of the reflex theory are of opinion that emboli cannot be considered probable. As a point in their favor they adduce the frequent entirely negative results of dissection.

One of the writers on this subject, Brauer, takes up an intermediate standpoint. He is of opinion, indeed, that in puncture of the pleura emboli form the commonest complication, and that gas emboli are the natural explanation, especially in the more serious cases; but on the other hand he admits that a reflex from the pleura may occur, although he believes this to be comparatively seldom. He has himself described an undoubted case of pleural reflex arising from the costal pleura. In the case of a patient with pneumothorax who was to be treated for the first time, an attack of suffocation occurred when the cannula came in contact wth the exposed costal pleura, a spasm of the glottis, which did not subside until five minutes had elapsed. After an interval of 15 minutes, a light touch with a probe again produced a similar attack. After anesthetizing with novocain, the pleura was punctured with a forcible thrust, a fresh, though less violent attack being brought on. On the other hand, the subsequent treatment with numerous punctures was carried out without complications. It is obvious that there cannot well be any question of air emboli in this case.

The careful study of the literature which Begtrup-Hansen has exhibited in his work on artificial pneumothorax seems to indicate that even serious phenomena which are not always capable of explanation by the embolus theory, may really occur in consequence of even slight pleura manipulations such as an exploratory puncture or the changing of a drainage tube, or merely through touching the pleura. It is sufficiently apparent from the highly instructive controversy between the Swedish doctors, Professor Carl Sundberg and Dr. Em. Lindhagen, on the subject of Sundberg's paper on the cause of the sudden deaths under the pneumothorax treatment, that in the individual cases it will often be extremely difficult, not to say impossible, to decide definitely the question "embolus or reflex." The instructive articles are well calculated to convince the reader of the difficulty there may be in answering the question in any one given case.

It is obvious that the conditions that apply to the pleura do not permit of being transferred without more ado to the maxillary antrum. The views that are urged for and against a pleura reflex on the one hand and an air embolus on the other, are nevertheless of some interest to us and must therefore not be passed over in a discussion such as this.

Just as there may be difficulty in explaining definitely the symptoms that may appear in connection with a thoracocentesis, so will it be impossible in each separate case to give a satisfactory explanation of the phenomena that are described after an antrum puncture. Nor has this been the primary aim of this work. The main object has been to give an account of the factors that have to be taken into consideration in an antrum puncture, and to direct attention to conditions which, as far as I know, have not been brought forward either in text-books or in our special literature.

As previously pointed out, taken relatively, the serious symptoms appear seldom,* but they are nevertheless of considerable importance from the fact that these phenomena, when they do occur, are fraught with the greatest danger to the life of the patient. We ought therefore to make up our minds that antrum puncture, though apparently such a simple operation, is yet not entirely free from all risk.

The question then is how this risk, which may attend puncture, is, if possible, to be avoided. There are in particular two factors which should be taken into consideration in an antrum puncture. One is the narrow, stenosed ostium maxillare, the other, which is of still greater importance, the thick, firm antrum wall.

If the ostium maxillare, notwithstanding the usual cocainizing, is stenosed, so that the advance of the air through the ostium is impeded, the opening in the lower meatus, especially in more acute sinusitis with tender mucous membrane, should be made sufficiently large for the air and water to pass through it without too greatly increasing the pressure in the antrum.

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*In reality, however, these antrum cases do not appear so rarely as is generally believed. During a discussion on this paper in the Oto-Laryngological Society in Stockholm, several cases were mentioned by Prof. Barany, Dr. Henning, Dr. Sture Berggren and Dr. Ohman.

If the wall of the lower meatus is so thick and offers such resistance to the insertion of the trocar that the needle can only penetrate the bony wall very gradually, it would perhaps be safest to withdraw the needle, and instead choose the way through the middle meatus. If, for some reason or other, it is nevertheless considered desirable to use the trocar through the lower meatus, the utmost caution should be exercised, as under these conditions it is impossible to be certain that there has been no loosening of the mucous membrane. It might then be better on the whole not to give an injection of air, but on the contrary to endeavor, by aspiration, to make the diagnosis clear, if one does not prefer at once to make a large opening.

In conclusion it is my agreeable duty to offer to Professor S. Torup, head of the Physiological Institute of the Kristiania University, my thanks for his assistance during the preparation of this work.

My thanks are also due to Professor Kr. Schreiner, director of the Anatomical Institute of the University, for his kind readiness to assist me in the numerous very complicated anatomic questions which are opened up in this work, and in no less a degree for his choice of the anatomic drawings which have so greatly facilitated a comprehension of the anatomic conditions that here come under consideration.

I would also take this opportunity of expressing my sincere thanks to Professor Holger Möllgaard, Professor E. Schmiegelow, of Copenhagen, and to Dr. Andreas Janberg, of Kristiania, as also to those of my colleagues who have kindly allowed me to report their cases.

BRANCHES FROM THE MAXILLARY NERVE.

1. Meningeal nerve (middle).
2. Zygomatic nerve.
   2 a. Zygomatic facial branch.
   2 b. Zygomatic temporal branch.
   2 c. Anastomosis between zygomatic temporal branch and lacrimal nerve.
3. Sphenopalatine nerves.
4. Infraorbital nerve.
   4 a. Superior posterior alveolar branches.
   4 b. Superior middle alveolar branch.
   4 c. Superior anterior alveolar branch.
   4 d. Superior dental plexus.
   4 e. Terminal branches of infraorbital nerve (inferior palpebral, nasal and superior labial branches).
5. Sphenopalatine ganglion.
6-9. Branches from sphenopalatine ganglion.
6. Posterior superior nasal branches (median and lateral).
7. Anterior palatine nerve.
   7 a. Posterior inferial nasal branches.
8. Median palataine nerve.
9. Posterior palatine nerve.
10. Nerve of the pterygoid (Vidian) canal (great superficial petrosal nerve and deep petrosal nerve).

BRANCHES FROM OPHTHALMIC NERVE.

11. Nasociliary nerves.
12. Frontal nerve.
13. Lacrimal nerve.
   13 a. Terminal branches of lacrimal nerve.
14. Spinal tract of trigeminal nerve
15. Nucleus of spinal tract of trigeminal nerve
16. Quintothalamic tract.
17. Gray reticular substance (respiratory center in medulla oblongata).
18. Nucleus of facial nerve.
19. Root fibers of facial nerve.
20, 21. Descending tracts issuing from the respiratory center and ending round the nuclei of the phrenic and intercosal nerves in the spinal medulla.
22. Phrenic nerve, motor root fibers.
23. Motor root fibers of intercostal nerves.

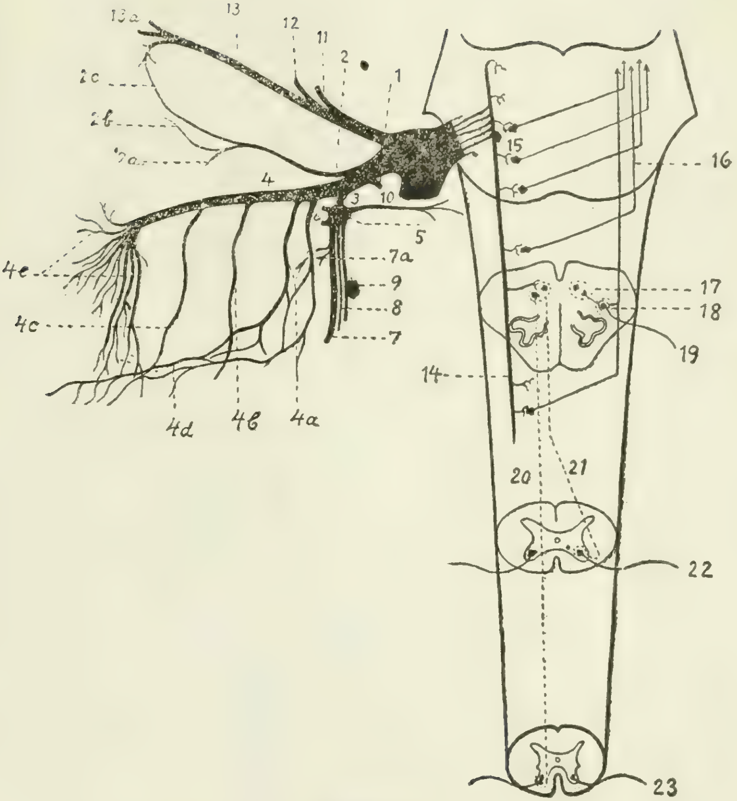

FIGURE I.

Diagram of the peripheral branches from the maxillary nerve, the central trigeminal tracts and their connections with the respiratory center and the facial nucleus.

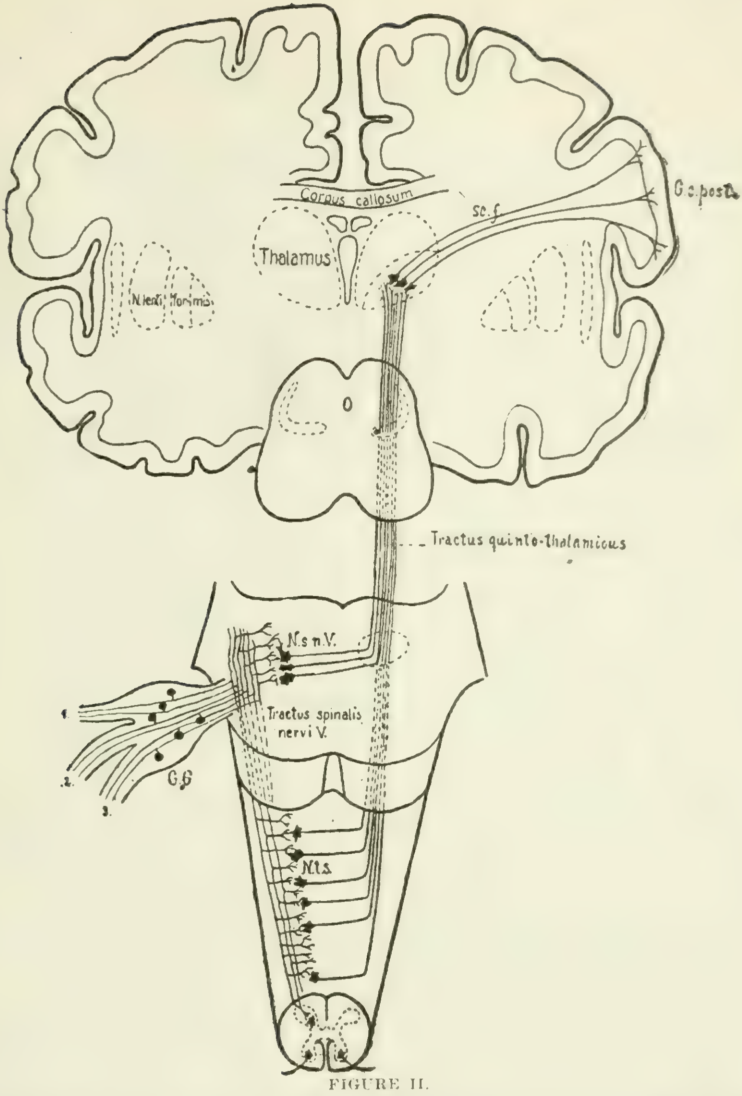

FIGURE II.

The central trigeminal tracts (from Bechterew). 1. 2. 3. = the 1st. 2nd and 3rd branches of the trigeminal; G. G. = Gasserian ganglion; G. c. post. = posterior central gyrus; N. s. n. V. = sensory nucleus of the trigeminal nerve: N. t. s. = nucleus of the spinal tract of the trigeminal nerve: sc. f. = subcortical fibers from the thalamus to the lower part of the posterior central gyrus.

On the left of the drawing a connection between the descending trigeminal root and the respiratory center is indicated. On the right there is an indication of the connection between the respiratory center and the nucleus of the facial, and further the way in which collaterals run from the fibers in the quintothalamic tract to the cells in the nucleus of the facial.

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XLIII.

CASE OF SARCOMA OF THE NASOPHARYNX WITH SOME INTERESTING FEATURES.

By Dunbar Roy, A. B., M. D.,

Atlanta.

At the annual meeting of this society in 1909 the writer presented the history of a case of sarcoma of the sphenoid with additional remarks concerning the literature bearing upon this particular subject. The present case, while differing somewhat from the other in its anatomic location, yet showed many similar clinical symptoms and points of interest in that they were developed very gradually and the writer had the opportunity of watching these throughout the course of the disease.

Mrs. R. T. B., white, age 70, consulted me in the summer of 1916 on account of some deafness in the left ear.

Mrs. B. was a frail little woman, although she had never had a serious spell of illness in her life except as mentioned below.

Family history, negative as far as any positive record of systemic dyscrasia.

The only complaint elicited from the patient was the fact that she was becoming deaf in the left ear, accompanied by a feeling of fullness. She had never had earaches or discharging ears as a child, and she was comparatively free from colds. She was also troubled with an enlarged gland just below the ramus of the lower jaw on the right side. This was about the size of the end of the thumb and slightly tender.

Nasal cavities: Right side free and normal in appearance. Left side, narrow and a small nasal spur at the base of the septum.

Nasopharynx: Appearance normal with the exception of a slight swelling in the neighborhood of the mouth of the left eustachian tube. Pharynx and tonsils normal.

Ears: Right, canal and drum normal. Hearing normal. Left, canal normal. Drum slightly thickened. Watch heard on contact and forced whisper at two feet. Tuning fork C heard much longer by bone conduction.

The catheter was passed with some difficulty and inflation only partially accomplished.

Treatment at this time consisted in the internal administration of small doses of the iodid of potassium and mercury salve to the enlarged gland. The left ear was treated by inflations. At no time was there any bleeding from the passing of the catheter. The patient improved only slightly, and in a few weeks left for her old home in Alabama.

February 27, 1917, seven months later, the patient again consulted me on account of the left ear. She seemed some weaker in appearance. The patient gave me the interim history as follows: Soon after returning home she had an attack of gall stones and suffered intensely. This was treated medically and she was relieved without any operation. At the same time the enlarged gland on the right side disappeared, and examination showed this statement to be correct. Apparently she was feeling much better, with the exception of the increasing tinnitus and deafness in the left ear and with considerable difficulty in breathing through the left nasal cavity. In fact, at night she was compelled to breathe entirely through the mouth. This symptom was telling most decidedly on the equilibrium of her nervous system.

Examination: The pharynx showed thickening and bulging of the soft palate on the left side. No ulceration was found. The tonsils apepared normal. The patient talked with a decided symptom of paralysis of the soft palate, as is seen sometimes after diphtheria. The right nasal cavity appeared normal.

On the left side there can be seen a firm gelatinous looking growth far back at its junction with the nasopharynx. Manipulation shows it to be of firm consistency and bleeding very slightly when touched.

It was impossible to pass the eustachian catheter on that side, as the growth involved that whole upper part of the nasopharynx. A clinical diagnosis of sarcoma of the nasal cavity and nasopharynx was made. On account of previous experiences with the operative treatment in this class of cases, I advised the use of radium immediately.

A tube containing ten milligrams of radium was placed immediately against the growth through the nasal cavity and allowed to remain one hour. This was repeated every fifth day until four applications had been used. No very marked reaction or improvement could be seen at the end of this time, and the patient desiring to visit her son in Memphis, Tenn., was advised to make the trip and consult Dr. E. C. Ellett in that city. One month later I received a letter from Dr. Ellett stating that a Wassermann showed a plus two in the case of Mrs. B., and that two salvarsan injections had been given, with great improvement in the patient's condition and they greatly hoped that she would be cured. Three months later the patient returned to Atlanta and brought me the following note:

"Memphis, Tenn., October 2, 1917.

"Dear Dr. Roy—You probably remember the case of Mrs. B., whom you saw last spring. A reference to your notes will recall to your memory the fact that the question of diagnosis was between specific trouble and malignancy.

"She left Atlanta and came here to Dr. Ellett, who referred her to me.

"A Wassermann gave plus two positive, and she was, of course, put upon antispecific treatment, getting three doses of salvarsan and iodid internally with mercurial injections.

For a time there was improvement which, however, might have been the result of the radium treatment which she had in Atlanta. At any rate, a continuation of the antispecific treatment has not resulted in continued improvement. I think she has had a fair test of the antispecific treatment without benefit, and had, therefore, best be treated with radium in the future. Very sincerely, "JNO. M. MAURY."

Another thorough examination of our patient showed that the growth had much increased and that the ethmoid cells on the left side were being invaded.

I then advised her daughter to take Mrs. B. to Dr. Kelly's hospital in Baltimore, where she could obtain more intensive radium treatment, as I thought this was the only chance for prolonging her mother's life.

This advice was taken. Dr. C. V. Burnham sent me the following report: "Section from nasopharynx growth small round cell sarcoma. The X-ray plates of the head give no evidence of any bony growth, and while the left antrum appears cloudy, this may be due to the position of the head."

The patient remained in the Baltimore hospital for four months, receiving radium treatments as follows:

Nov. 28, 1917, 1,198 mgs., 2 hours, applied to neck.
Nov. 30, 480 mgs., 1 hour, applied to neck.
Dec. 2, 2,494 mgs., 1 hour, applied to neck.
Dec. 4, 1,024 mgs., 3 min., direct to neck.
Dec. 6, 844 mgs., 1 hour, applied to neck.
Dec. 8, 1238 mgs., 2 hours, applied to neck.
Dec. 10, 1,015 mgs., 1 hour, applied to left cheek.
Dec. 14, 500 mgs., 1 hour, applied to neck.
Dec. 16, 917 mgs., 1 hour, applied to neck.
Dec. 12, 958 mgs., 1 hour, applied to neck.
Jan. 4, 1918, 764 mgs., 1 hour, applied to neck.
Jan. 6, 842 mgs., 1 hour, applied to neck.
Jan. 7, 971 mgs., 1 hour, applied to neck.
Jan. 9, 1,857 mgs., ¾ hour, applied to neck.
Jan. 11, 531 mgs., 3 min., direct to throat.
Jan. 13, 760 mgs., 5½ min., direct to nose and throat.
Jan. 15, 1,163 mgs., 1 hour, applied to head.
Jan. 17, 694 mgs., 3 min., direct to nose and throat.
Jan. 19, 873 mgs., 1 hour, applied to neck.
Jan. 21, 1,200 mgs., 1 hour, applied direct to neck.
Jan. 23, 1,011 mgs., 1 hour, applied direct to neck.
Jan. 25, 764 mgs., 2 min., direct to nasopharynx.
Jan. 28, 965 mgs., 1 hour, applied to neck.
Jan. 30, 1,065 mgs., 1 hour, applied to neck.
Feb. 1, 1,060 mgs., 1 hour, applied to neck.
Feb. 4, 999 mgs., 1 hour, applied to neck.
Feb. 6, 953 mgs., 1 hour, applied to neck.
Feb. 8, 501 mgs., 4 min., direct to throat.
Feb. 11, 1,159 mgs., 1 hour, applied to neck.
Feb. 13, 883 mgs., 3 min., direct to throat.
Feb. 15, 495 mgs., 1½ min., direct to throat.
Feb. 16, 594 mgs., 3 min., direct to throat.
Feb. 18, 1,009 mgs., 1 hour, applied to left side of head.
Feb. 20, 1,058 mgs., 1 hour, applied to left side of head.
Feb. 23, 1,150 mgs., 1 hour, applied to neck.

Feb. 25, 1,096 mgs., 1 hour, applied to neck.
Feb. 27, 1,078 mgs., 1 hour, applied to neck.
Feb. 28, 805 mgs., 1½ hour., applied to head.
March 4, 1,137 mgs., 1 hour, applied to neck.
March 6, 615 mgs., 1 hour, applied to neck.
March 8, 628 mgs., 6 min., direct to nasopharynx.
March 11, 1,031 mgs., 1 hour, applied to neck.
March 13, 1,118 mgs., 1 hour, applied to neck.
March 15, 1,097 mgs., 1 hour, applied to neck.
March 19, 959 mgs., 6 min., direct to throat.

On her history chart the following note was made at the time of the last visit: "The right eustachian tube easily seen. Left one not seen very well. Left nostril quite difficult to enter. The patient cannot breathe through the left nostril, but blows through it better than she used to. Growth is much reduced. There is a defect in soft palate on left. Swelling on the left side is quite small compared to what it was, but there is just as much discharge as ever."

An office examination made by me on her return showed the following condition: Patient certainly seems stronger and in better spirits. The growth in the nasopharynx had been reduced at least two-thirds. The left nasal cavity posteriorly is completely filled with the growth, accompanied by a profuse purulent discharge which is quite offensive. The nasal cavity was kept as clean as possible. The hearing in the left ear was practically negative. The patient returned to her old home in Alabama expecting later to again have the radium treatment in Baltimore. However, the patient's condition gradually became worse, and in two months she died, evidently from a generous sarcomatous toxemia.

Remarks: The fact that this case showed a plus two Wassermann reaction is by no means unusual. Pathologists tell us that it is not uncomon to have a positive Wassermann in cases of malignant growths, tuberculosis, malaria and other similar conditions.

It is for this reason the writer believes that too much confidence is placed in this test for the determination of syphilis. In a paper before this society last year he called attention especially to this one fact. The partial disappearance of the nasopharyngeal portion of the growth under the influence of radium was indeed remarkable. The writer would not have believed that such was possible had not the case been under his own personal observation. Had not the growth penetrated into the vascular region of the ethmoid cells the patient might have gotten far better results. Early recognition of malignant growths in the nasopharynx and the early application of large doses of radium offer the best chance for its cure, and to the mind of the writer is the rational method of handling these cases. The use of radium has passed the experimental stage.

To the writer the chapter on sarcoma of the nasal cavities and nasopharynx is one of the darkest pages in rhinologic literature. It has been my misfortune to have charge of eight cases of sarcoma of the nasopharynx, and although every known method of treatment was used, operative, electropuncture, Coley's fluid, radium, ligation of the carotids, etc., they all died, so that I have come to the point of being in full accord with Dr. Shambaugh, who said: "Most of the cases of sarcoma of the nose reported as cured by operation may have really been mistakes in diagnosis in which inflammatory tissue was mistaken for sarcoma."

Only two of these eight cases have ever been reported by me, and I am sure that this experience of mine coincides with that of many other rhinologists who have treated such cases and have never published the same, consequently the bibliographic statistics in reference to nasal sarcoma must be absolutely misleading. In fact, it will be found by reading the summary of cases appended to this article that it is remarkable how frequently the immediate results are given in a case following a successful operation, and, on the other hand, how few of the end results are reported on these very same cases.

It is certainly unfortunate to be so pessimistic, but the management of these malignant growths and a study of the final results honestly reported certainly does not add one ray of optimism. The writer has long viewed with a suspicious eye the presence of any growth in the nasal cavities of the young adult situated in the region of the ethmoid and which is accompanied by periodic epistaxis and which bleeds freely with the slightest manipulation.

Eighteen years ago a young man seventeen years of age consulted me on account of periodic epistaxis. Examination showed small red warty gelatinous growth on the middle turbinate of the right side. Concluding without microscopic examination that the same was probably an angioma, I removed it without difficulty and with very little hemorrhage. In two days the surface looked normal, and the young man returned home. One month later he again appeared, with difficulty in breathing on that side. An examination showed a hard vascular diffused growth in the whole apex of the nose. Sarcoma was immediately suspected, which was confirmed by the microscope. Active treatment was immediately instituted. Evidently the whole ethmoid body was infiltrated, and an operation by extirpation was out of the question. Ligation of the common carotid was immediately performed. Coley's fluid, which at that time was being greatly extolled, was most consistently used. Radium had not as yet been tried. In spite of all that was done the growth gradually invaded the whole ethmoid body on both sides, and in two months' time he presented the most horrible picture I have ever seen. The bridge of the nose was almost on the same line with the side of the face. The frontal bone at the root of the nose stuck out like a small sized orange. Both eyes were protruded and immobile. He died shortly from exhaustion and sarcomatous infiltration of the brain substance.

The literature on the subject of sarcoma of the nasal cavities and nasopharynx is quite extensive, but it throws very little light on any curative measures which can be used for its management. Numerous cases have been reported as cured, but the writer is firmly convinced that there must be different degrees of malignancy or that there has been a mistaken diagnosis.

It is not the intention of the writer to discuss the bibliography of this subject nor to discuss statistics. This has been done in numerous articles, all of which have added very little to the one important phase, which is, What is the best line of treatment in this class of cases, both as to the final result and as to the future comfort of the patient? However, in order to make this subject more complete the writer has compiled in statistical form the various reports which have been published dealing with sarcoma of the nose and nasopharynx, embracing the subject of the different methods of treatment which were used in each case and the results obtained.

In 1910 there appeared in the Transactions of this society a paper by our lamented member, Dr. J. Price Brown. It was a plea for the more conservative surgery of nasal sarcoma by the use of the electrocautery operation. The arguments adduced by Dr. Brown were most logically reinforced by a study of the results obtained by others in the use of the more radical operation with the knife. The following quotation from this article is worthy of more than ordinary consideration: "The site of formation of the sarcoma is at the back end of a bony box situated in the middle of the face and below the floor of the skull. Although this box is fragile and split in two by a bony wall, yet each half is abundantly provided with spongy tissues which are filled to repletion with capillaries and blood vessels, glands and lymphatic channels, more abundantly probably in proportion to its size than any other region of the body. In this tissue, whatever may be the cause, the sarcoma has its origin, and, taking on the attributes incident to its position, it grows rapidly, fills itself with blood spaces and bleeds easily. When the surgeon becoming alarmed by its size proceeds to operate, he not only removes the neoplasm but the bony tissues that surround it in order to take away every vestige of the disease. At the same time the lymphatic channels and blood spaces so freely opened by the operation are ready to carry any germs that may remain to a deeper habitation, and the early recurrence of the disease in so many cases proves the correctness of this conclusion."

There is a world of truth in this statement. When the antrum is involved the force of these remarks are not so applicable, for we all realize that anything short of a complete resection of the superior maxilla is inadvisable, although even this will probably be futile. There have been numerous reports of the most excellent results obtained in the treatment of sarcoma in different parts of the body by the use of radium therapy. The writer is convinced in his own mind that should he personally ever be afflicted with sarcoma of the nasal passages he would much prefer the final results probably to be obtained by this latter method of treatment than any surgical procedure.

A very interesting article has lately been published by Eiken, reviewing the experiences at Rovsing's private clinic with roentgen treatment of sarcoma. The results reported in a number of cases were certainly most encouraging. One case in particular was a sarcoma of the orbit where both surgical and roentgen treatment were used in conjunction with a successful result.

The writer has now under his observation a young girl, 16 years of age, who developed at the age of 10 a sarcoma of the upper lid, extending partly in the orbit. The tumor has been removed five times, and at the last two operations 50 mg. of radium was left deep in the wound for four hours after operation and then the wound was closed. At present radium is being used externally at varying intervals with apparent success. This case has been under observation for six years. The rapid disappearance in the size of the growth accomplished by the use of the radium in this case is certainly most gratifying, and there is no doubt that the use of this remedy is aiding our patient both in comfort and prolongation of life.

If one will study the literature of this subject, especially in reference to the treatment, he will be surprised to find that the real good results from treatment have been obtained by the use of the X-ray and radium, and especially the latter. The writer believes that the possibilities from radium treatment are still in their infancy, and that the next few years will show the reports of many cases where malignant growths in the nose and nasopharynx have yielded to this mysterious remedy in a manner far superior to all other known methods of treatment, especially the socalled operative procedures.

Review of Literature,

General Discussions and Collection of Cases.

Arranged by Date.

SARCOMA OF THE NASAL SEPTUM.

Clark, J. P. Amer. Laryngol. Assoc. Trans., 1898—XX—183.

Bosworth in 1889 collected 41 cases of nasal sarcoma, about half of which were sarcoma of the septum; in 1891 the author added 7 cases to this list; in 1896, Boylan added 14 more.

Since 1896 the author has found 14 cases, and consulted reports of 10 of these. Boylan says of the 21 cases which he analyzed (seven of which were noted by the author in 1891) that in 2 cases no operation was attempted, in 2 cases it was admittedly incomplete, leaving 17 in which extirpation was attempted. Of these, in 5 no later history is given, in 7 the length of time the case was observed after operation is not given; in only 3 is it distinctly stated that there was no recurrence a year or more after operation. In Boylan's case the growth was removed by a snare, and the site thoroughly curetted. No sign of recurrence for over a year after operation.

In the 10 cases since 1896 reviewed by the author 7 died of the disease, in 1 the growth was so extensive that operation was considered inadvisable; another case was lost sight of. The one which recovered (no recurrence over 2 years later) was operated with snare and curette. In one of the 7 fatal cases no operation was attempted. The author reports one new case; radical operation; operation June 1, 1897; no recurrence March 28, 1898.

PRIMARY SARCOMA OF THE NOSE.

Harris, T. J. Phila. Month. Med. J., 1899—I—337.

Reports 5 cases of his own, to which he adds 57 cases in addition to Bosworth's report. This makes a total of 103 cases. An analysis of these 103 cases shows that the termination was not stated in 48 cases; that in the 55 cases remaining, 25 (or 46 per cent) are reported as dead. There is one case reported as recovered after operation, nature of operation not stated; 11 cases without recurrence 6 to 12 months after intranasal operation; 4 cases without recurrence at end of 2 years after intranasal operation; 11 cases without recurrence 6 months to 1 year after external operation; 3 cases without recurrence at end of 2 years after external operation. A year is not sufficient length of time to prove a cure. So the mortality is probably higher than indicated by the above statistics. In regard to treatment, Dr. Harris says: "Operation is indicated at the earliest possible moment. In many cases a radical operation is the proper method, but in cases in which the entire tumor is thoroughly exposed to view and in reach an internasal operation only is justified."

MALIGNANT DISEASE OF THE NOSE AND ACCESSORY SINUSES.

Gibb, J. S. N. York State J. Med., 1902—II—24, 56.

Gibb gives a tabulation and summary of 111 cases of sarcoma of the nasal chambers, 3 cases of sarcoma of the antrum and sinuses, 12 cases of sarcoma of the nasopharynx.

In the first and largest group—sarcoma of the nasal chambers—subsequent history is given in 31 cases after the complete eradication, in 4 cases 1 month elapsed, 13 cases from 2 to 12 months, 9 cases from 1 to 2 years, 3 cases from 2 to 3 years, 1 case from 3 to 4 years, and 1 case in 7 years without recurrence.

In regard to methods of treatment in these cases, the author says: "The earlier the case is seen before encroachment upon surrounding tissues has taken place the more is to be expected from operative interference. Small growths with moderate attachments may be removed by intranasal methods —e. g , the snare, cautery and curette, with very fair prospect of ultimate success. When the growth has extended beyond the confines of the nasal chambers and involved the sinuses little can be accomplished through intranasal methods. In these more advanced cases only the most thorough and complete radical measures offer the least prospect of success."

In the 12 cases of sarcoma of the nasopharynx, there were but two in which no recurrence had taken place at the time of the report, and in these the interval was too brief to base conclusions (four months and one year, respectively). In the case in which there was no recurrence for a year, the growth was removed by galvanocautery snare; in the other case by radical operation (third operation). In the three cases of sarcoma of the antrum and sinuses, one case had no recurrence after eight years, following a radical operation.

MALIGNANT GROWTHS OF NOSE AND NASOPHARYNX.

Cobb, F. C. Am. Laryngol., Rhinol. and Otol. Soc. Trans., 1904—X—147; also in Laryngoscope, 1904—XIV—577.

Reports from records of the hospital 11 cases of sarcoma of the nose: "The operations done varied from removal by revulsion in the early cases to excision of the upper jaw in the later cases. In only the early cases do we find the report 'cured,' and these were by evulsion and before careful examination by the rhinologist. Even the cases most radically operated showed signs of regrowth almost before leaving the hospital." Author also reports three cases from private practice, all resulting unfavorably, "although operated by the best surgeons and by the most radical methods."

This author says: "Removal by intranasal method as a palliative measure may be advised where some indication prevents operation by a more radical method. Where such method is resorted to the galvanocautery loop is probably the safest instrument, although the cold wire snare, if carefully and slowly used, may be recommended. The success attending the major operations, such as excision of the jaw, is very far from encouraging, yet operation may be resorted to as a forlorn hope, or to relieve the urgency of some of the symptoms. There always remains a faint possibility of success, although the prognosis, even with the most radical operations, is extremely doubtful.

SARCOMATA OF THE NASAL SEPTUM.

Johnston, R. H. Laryngoscope, 1904—XIV—454.

Says in regard to treatment, that the medical treatment can only be palliative and applied to inoperable cases. Arsenic may be used in these cases. The intranasal operation is to be preferred, especially where the diagnosis has been made promptly and the entire growth can probably be removed. The possible methods are tearing out with forceps, excision, curetting, cauterizing and electrolysis. "Probably the safest operation is the removal of the growth or as much of it as possible by the hot snare. This procedure can be followed by the curette and cautery if necessary. The cautery should be applied not only to the base of the growth but to the surrounding tissue." Sometimes the tumor can best be removed at several successive operations. The author adds a list of 71 cases of sarcoma of the nasal septum, 31 of which are recorded as having recovered after operation, while in 14 there was recurrence in a short time or in a few years.

In the others the result is not given. The nature of the treatment is not included in his tabulation.

SARCOMA OF THE NASAL PASSAGES—150 CASES.

Watson, J. A. Am. Med., 1904—VII—553.

Reviews 150 cases, including those reported by Bosworth and Gibb. The ultimate history of 45 cases does not appear in the records; of the remaining 105 cases, 62 patients are stated to have recovered; in only 28 of these 62 does the history subsequent to treatment extend over a period longer than six months, which renders the statement of recovery in the remaining 34 cases almost useless.

In regard to the method of treatment, 48 cases were submitted to radical operation, of which subsequent history was not reported in 13, recurrence or death in 16, recovery and freedom from recurrence for a variable period in 19; percentage of cure in radical operation, 39.58. In 64 cases, treated by intranasal operation, result not stated in 8, recovery in 35; recurrence or death in 21; percentage of recoveries, 54.68. "Apart from surgical measures the only treatment worthy of consideration is that by toxins, either or streptococcus erysipelatis or Coley's fluid. In none of the cases of the present series in which this treatment was tried was there any noticeable improvement." Author reports four cases:

No. 1. Removed by cold wire snare, no curettement. No recurrence "in almost two years."

No. 2. Tumor removed in several operations, using snares, forceps and curette. No recurrence in a year and a half.

No. 3. Part of tumor removed by intranasal operation, with relief of symptoms; radical operation refused; disease stationary at time of report (over two years after operation); several attacks of erysipelas, which may have retarded growth.

No. 4. Tumor removed by cold snare. No recurrence in several months.

CONTRIBUTION A L'ETUDE DES SARCOMES DES FOSSES NASALES.

Delamarre, A. Thesis, Paris, 1905.

Treatment must be surgical; medical treatment is indicated only when the tumor is inoperable. If the tumor is limited to the nasal fossa, the endonasal route may be employed; the tumor removed at a single or several operations, and the site thoroughly cauterized. If the tumor is located too far up, or has spread too widely to be reached by the intranasal route, an external operation is indicated. The author prefers the Moure operation, or for a tumor extending to the maxillary sinus, a combination of the Moure and Caldwell-Luc operation.

The author has collected 27 cases, including three of his own. Of these 10 are reported as having died; 2 were without recurrence, 6 and 9 months after radical operation; 1 without recurrence 6 months after intranasal operation; in the remainder, there was either early recurrence or no definite statement of results.

STATISTICAL REPORT ON RESULTS OF OPERATION IN SARCOMA OF THE NOSE.

Brown, J. P. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1906—XV.

Brown gathered reports by personal communication from fifty laryngologists in the United States and Canada.

Of the cases reported 20 were inoperable; there were 19 intranasal operations with 6 recoveries (19 per cent); 33 extranasal operations with 8 recoveries (24 per cent). Total permanent recoveries after operations, 13 out of 51, or 27 per cent.

Reports in detail his fourth case treated by electrocautery; death from sepsis. This case is included in his later reports.

PRIMARY MELANOSARCOMA OF THE NOSE. REVIEW OF LITERATURE.

Coakley, C. G. Am. Laryngol., Rhinol. and Otol. Soc. Trans., 1907—430.

Reports one case of melanosarcoma of the nose, of which portions were removed by the knife, and by the cold wire snare, at three different operations. Curettage and the galvanocautery were recommended by the author in the case, but refused by the patient. A powder containing powdered suprarenal gland and antipyrin was given to aid in controlling hemorrhage. Final results not reported.

The author adds case reports of 16 other cases of melanosarcoma of the nose, making a total of 17 cases. Of these 17 cases, seven are reported as having died, and of these seven, five were subjected to extensive operations. Of the remainder, two patients (cases 3 and 5) "probably did not live very long, judging from the reported condition." Case 7 had no recurrence after 15 years, case 5 none after 1½ years; case 6 recurred slightly after three years and was reoperated. Case 9 recurred in two months, was operated on and "some months" later was free from return. Case 10, no recurrence after 1½ years; case 12, slight recurrence after three months, reoperated, and no recurrence after a year and a half. The author says:

"All of these cases reported as nonrecurring were treated by curettage, galvanocautery snare, thermocautery, or some combination of these therapeutic measures. This has so impressed me that should my patient consent to allow me to attempt a cure I will adopt them in preference to more radical surgical procedures."

SARCOMA OF THE NOSE.

Downie, W. Glasgow Med. J., 1907—LXVIII—103.

Reports six cases of sarcoma of nose, two inoperable on account of extent of tumor.

One case operated by Volkmann spoon and electrocautery; small recurrences were removed at different times later, but patient did not remain under observation.

One case operated by Rouge's method; general health good and no recurrence three years later.

One case tumor partially removed; cubiform plate involved; death from extension to meninges.

One case, several growths removed; later recurrences removed, and surfaces cauterized very freely. Some of the earlier growths partially myxomatous in character, partially sarcomatous; some later growths definitely sarcomatous. No recurrence in four months after last cauterization.

The author says in regard to treatment: Where the growth is wholly intranasal, "it should be removed through the nares by punch forceps, curettes, etc., followed by the free use of the electric cautery. The repetition of such operative procedures may be necessary time and again until the affected structures are extirpated. When the disease is recognized early and treated in this fashion, the prognosis, I think, will be more than favorable. When the septum is involved, and where the area from which the new growth springs is widespread, its eradication may be made more easy and more satisfactory by having recourse to Rouge's operation."

DIE MALIGNEN TUMOREN DER INNEREN NASE.

Harmer, L., and Glas, E. Deutsche Zeitschr. f. Chir., 1907—
LXXXIX—433.

Report deals mostly with carcinoma, includes six cases of sarcoma, no late report obtained for one case operated endonasally; in another operated endonasally, no recurrence in a year. The four other cases had radical external operations; one of these had recurrence and died; the others had no symptoms of recurrence in one year to fifteen months after operation.

These authors in their general discussion mention the Roentgen ray and radium as methods of treatment, but in relation to nasal carcinoma only.

SARCOMA OF THE NOSE AND NASOPHARYNX.

Farrel, T. H. Am. Laryngol., Rhinol. and Otol. Soc. Trans.,
1910—203: Also in: Ann. Otol., Rhinol. and Laryngol.,
St. Louis, 1911—XX—67.

Reports one case sarcoma of nose, radical operation, removal of left superior maxilla; recurrences in nasal fossæ curetted several times and finally left external carotid artery ligated. Treated with arsenic. Later, recurrence in nasopharynx, operated, with good operative result. But general health became bad and patient died.

Eighteen cases of nasal sarcoma collected by author in addition to the one reported above and to those reported by Watson (1904). "In the large majority of these cases surgical treatment was the one relied on, though benefit is claimed from X-rays in one, injections of adrenalin solution in another, and yellow oxid of mercury ointment with an alkalin spray in still another. The percentage of cures by external operation has been unusually large, viz., three out of five. In nine cases submitted to internal operations recovery occurred four times, recurrence or death four times, and the result was unknown in one. The extended experience I had with the one case would prejudice me in favor of intranasal operations. A radical antrum operation would have accomplished quite as much as the excision of the maxilla."

MALIGNANT TUMORS OF THE NASOPHARYNX.

Kelsey, A. L., and Brown, J. M. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1913—XXII—1147.

The authors, in discussion of treatment, mention one case reported of malignant tumor of the nasopharynx (not stated whether sarcoma or not) "where the tumor disappeared after using radium, but the patient died six months later of meningitis, leading us to believe that the tumor, though apparently gone from the nasopharynx, was really progressing and had finally invaded the brain."

In regard to medical treatment, "the injection of alcohol, formalin, adrenalin and Coley's fluid has been tried with little success, only two cases being reported cured, one from the use of alcohol, and one by the use of formalin. Ligation of carotid artery is credited with one cured case."

"Many palliative and radical operations have been done by various methods, but the final results have proven very inadequate. Rhinologists, generally speaking, have stood against radical operations and favor conservative procedures, such as curettage, because it has been found that a large percentage of patients radically operated have not survived the operation."

The authors report one case of sarcoma of the nasopharynx removed by snare and curette through the nose. Recurrence in a few weeks and death.

UEBER DIE PRIMAREN MALIGNEN GESCHWULSTE DES NESENRACHENRAUMES.

Oppikofer, E. Arch. f. Laryngol. u. Rhinol., 1913—XXVII—526.

Author reports eleven cases of sarcoma of the nasopharynx, of which three were treated with arsenic alone; six with

Roentgen ray and arsenic internally; one with the Roentgen ray and morphin, and one was operated four times in all on account of recurrences, each operation followed by prolonged arsenic treatment. In two of the cases treated by Roentgen ray and arsenic, the tumor diminished in size and symptoms improved at first, but the improvement was not lasting and both cases died. The one case operated was examined and reported free from symptoms and tumor four years after the last operation. This was a lymphosarcoma. The author believes that these malignant tumors can be cured only occasionally by operation, even if combined with arsenic treatment. The Roentgen ray may relieve symptoms and reduce the size of the tumor temporarily, but does not effect a cure. Also fulguration, radium, thorium, etc., result in cure only very seldom, according to present reports (1913).

UEBER PRIMARE BOSARTIGE GESCHWULSTE DER NASENHOHLE UND DER NASENNEBENHOHLEN.

Safranck, J. Beitr. z. klin. Chir., 1913—LXXXIV—126.

The author advocates operation of the most radical nature that can be undertaken with consideration of the condition of the patient. He believes Roentgen therapy, radium and also arsenic are to be used chiefly as postoperative measures, and also in cases so far advanced as to be inoperable. He reports two cases of nasal sarcoma operated. Final results not stated.

LES TUMEURS MALIGNES DES SINUS DU NEZ ET DE LA CAVITE NASOPHARYNGIENNE.

Sendziak, J. Arch. internat. d. Laryngol., 1913—XXXVII —371.

The treatment of malignant tumors of the lateral sinus of the nose and of the nasopharynx is primarily surgical. All attempts to use "pseudospecific" serums (Coley's, erysipelas, etc.), as well as arsenic, do not give favorable results. It is only in operable cases or after surgical intervention that arsenic is indicated. Also electrolysis, the Roentgen ray, radium and the galvanocautery may also be employed in such cases. In some cases operation by the external route is indicated.

TRAITEMENT ET PRONOSTIC DER TUMEURS MALIGNES DES FOSSES NASALES ET DE L'HYPOPHARYNX.

Ferreri, G. Arch. internat. d. Laryngol., 1913-14—XXXVI —337, 133; XXXVII—77, 414.

Reports a series of 65 cases of malignant tumor of the nasal fossæ and hypopharynx; of these, 44 were sarcoma. Of these 27 (57.35 per cent) were reported as cured by operation.

SARCOMA OF THE NOSE AND NASOPHARYNX.

Dighton, A. Brit. J. Surg., 1914-15—II—384.

In a brief summary of the subject the author says, in regard to sarcoma of the nose: "All treatments, both operative and otherwise, have been tried with no very marked success. Bosworth says: The only treatment is the thorough and complete eradication of the growth, and this at the earliest period possible without regard to the character of the tissue; and this seems to be the recognized treatment today. Various operations have been described. Price-Brown recommends the electric cautery, but this treatment is open to the objection that many sarcoma seem to take on renewed life after its use." In sarcoma of the nasopharynx, "as in sarcoma of the nose, all methods have been tried and multitudinous operations invented with but little if any success."

The author reports a case of nasopharyngeal sarcoma. Radical operation. No report on later history.

CASE REPORTS.

1904 TO DATE.

I. CASES OPERATED (INCLUDING ELECTROCAUTERY). ARRANGED BY DATE.

NOTES ON CASES OF SARCOMA OF THE NOSE

(IN ADDITION TO THOSE CITED BY FARRELL, 1911.)

Brown, J. Price. Am. Larynygol. Assoc. Trans., 1903—XXV —209; 1905—XXVII—322.

First article reports first three cases of sarcoma of the nose treated by the electrocautery (repeated operations) combined with snare and scissor removal of parts of the tumor when necessary. The first case, no recurrence after 8½ years; the second case, no recurrence in 9 months; the third case still under observation and treatment, much improved.

In second report (1905), first case 10½ years without recurrence; second case, 2 years and 9 months without recurrence. The third case still had recurrences, but general health was good, and new growths were promptly treated by electrocautery. (See also case reports by Brown, 1909 and 1910.)

SARCOMA OF THE NASAL FOSSA.

Johnson, R. H. Med. Rec., 1906—LXX—909.

Reports one case operated, but without any attempt to remove the entire tumor, which was large and very vascular. Recurrence and death.

NASAL SARCOMA, WITH REPORT OF A CASE.

Watson, J. A. Laryngoscope, 1906—XVI—812.

Reports one case in addition to those noted in his 1904 article. Growth filled lower part of nasal fossa anteriorly; removed entirely by cold wire snare. No recurrence in 18 months. "This case substantiates the opinion expressed by the writer that intranasal operation is justifiable in many, if not in most, cases of sarcoma of the nasal passages."

PATIENT FROM WHOSE LEFT NOSTRIL A LARGE SARCOMATOUS TUMOR WAS REMOVED. NO RECURRENCE.

Connal, J. G. Glasgow Med. J., 1907—LXVII—58.

Reports one case of sarcoma of the nose removed at several sittings with scissors and cold snare, followed by thorough cauterization of the parts by electrocautery. No recurrence in 3½ years. Also mentioned a similar case treated in the same way; no recurrence in three years.

SOME OPERATIONS FOR REMOVAL OF MALIGNANT GROWTHS FROM THE NASOPHARYNX.

Eve., F. Brit. Med. J., 1907—I—485.

Reports two cases of sarcoma of the nasopharynx operated radically by osteoplastic resection of the upper jaw. One of these died from shock three hours after the operation. In the other, operative results were good; operation in September, no recurrence the following January.

Also reports a case operated by Nélatno's technic for sarcoma of the upper part of the nasopharynx. Operation June, 1905; no recurrence at last examination, in March, 1907.

ANGIOSARCOME DE LA CLOISON NASALE.

Bourguet, J. Toulouse Méd., 2nd ser., 1908—X—249.

Angiosarcoma of the nasal septum; removed by intranasal operation. Arsenic given after operation. Slight recurrence, which author believes can be arrested and removed.

MALIGNANT DISEASE OF THE NOSE.

Holmes, E. M. Am. Laryngol., Rhinol. and Otol. Soc. Trans., 1908, 260.

Includes three cases of sarcoma of the nose, all of extensive growth, all operated, but without cure. One case was greatly improved for a few months after operation, but this improvement was followed by recurrence and death. The other two died soon after being operated.

PRIMARY SARCOMA OF THE NASOPHARYNX. REPORT OF CASE.

McCaw, J. F. Laryngoscope, 1908—XVIII—968.

One case, sarcoma of the nasopharynx, operated by splitting soft palate and removing as much of growth as possible; daily injections of adrenalin chlorid given later; finally ligation of the carotid artery which led to temporary improvement. Recurrence with no hope of recovery.

SOME RECENT CASES OF NASAL SARCOMA.

Brown, J. Price. Ann. Otol., Rhinol. and Laryngol., 1909—XVIII—793. Also in Am. Laryngol. Assoc. Trans., 1909, 219. Same Cases Reported in Article in Journ. Laryngol., 1909—XXIV—352.

Reports his third case as without recurrence for 2½ years. The other two cases also well and without recurrence. (See his case reports, 1905.)

Reports one new case (No. 4), operative results good after several electrocautery treatments, but septic symptoms developed and death ensued.

Case 5, treated by electrocautery; growth removed; breathing normal. General health good; no recurrence for more than a month.

Case 6, treated with repeated electrocauterizations; nose free and tumor practically destroyed; case under observation.

Case 7, electrocautery, and curetting forceps also used. Improvement marked; under observation.

FURET, F.

Rev. hebd. d. laryngol., 1909—I—721.

No recurrence in four months after the Moure operation. Author states this is not sufficient time to judge of final results.

TWO CASES OF SARCOMA OF THE NOSE.

Brown, J. Price. Laryngoscope, 1910—XX—510.

See also article in Amer. Laryngol., Rhinol. and Otol. Soc. Trans., 1910, 255.

Two cases of nasal sarcoma, removed by electrocautery, with repeated operations for recurrences. Both cases at time of report had no signs of recurrence for several weeks; were under observation, and any new growths that might appear would be treated by electrocautery. The condition in the second case was not as good as in the first, but was being controlled at the time of the report.

NASAL MYXOSARCOMA IN A CHILD OF THREE YEARS.

Ross, G. T. Ann. Otol., Rhinol. and Laryngol., 1909—XVIII—562. Also in Laryngoscope, 1910—XX—188.

Intranasal operation with forceps, scissors and electrocautery, repeated four times for recurrences. Last operation November 30, 1908. On May 1, 1909, child entirely well; no sign of recurrence.

EIN LANGDAUERNDER FALL VON SARCOMA NASI.

Sonnenschein, R. Arch. f. Laryngol. u. Rhinol., 1909—XXII—413.

Reports a case lasting 11½ years, in which the sarcoma or parts of it were repeatedly removed with galvanocautery, snares, etc., but no radical operation. Patient still living at time of report, with growth in nose, enlarged glands, evidence of metastases.

Reviews literature briefly, without giving statistics of treatment, but states as his conclusion that operation is the treatment of choice.

FIBROSARCOMA OF THE NOSE REMOVED AFTER TEMPORARY LIGATURE OF BOTH CAROTID ARTERIES AND LARYNGECTOMY.

Harmer, D. Royal Soc. Med. Proc. 3: Clin. Sect. 122, 1909-10.

Large growth in left nostril projecting into orbit and antrum and into nasopharynx. Temporary ligature of both external carotid and laryngotomy to prevent hemorrhage; radical removal of tumor. Operative result good. No signs of recurrence two months later.

CASE OF INTRANASAL SARCOMA.

Scarlett, R. B. N. York M. J., 1910—XCII—708.

Case of spindle cell sarcoma in left nasal chamber and antrum. External radical operation. Recurrence and death in about a year.

CASE OF MYXOFIBROSARCOMA OF THE NOSE AND NASOPHARYNX; REMOVED. RECURRENCE.

Dougherty, D. S. Laryngoscope, 1911—XXI—650.

Essential facts indicated in above title.

CASE OF NASAL SARCOMA.

Knight, C. H. Laryngoscope, 1911—XXI—784. Also in Am. Laryngol. Assoc. Trans., 1911, 159.

One case; tumor removed with wire snare, followed by cauterization with trichloracetic acid. No return until thirteen years after, when another tumor of similar histologic type, "alveolar sarcoma," was removed by external operation. No recurrence for 3½ years.

SARCOMA OF THE NASAL FOSSA.

Peck, C. H. Ann. Surg., 1911—LIII—856.

One case, sarcoma of nasal fossa, right side. Removed by radical operation. Good operative result. No later report.

CONTRIBUTION A L'ETUDE DES TUMEURS MALIGNES DU NASOPHARYNX.

Aboulker, H. Bull. d'oto-rhino-laryngol., 1912—XV—115.

Deals mostly with cancer. Reports only one case of fibrosarcoma of the nasopharynx. Thorough curettage. Recurrence of symptoms and death.

CASE OF MELANOTIC SARCOMA OF THE NOSE.

Wilkinson, G. J. Laryngol., 1912—XXVII—1.

One case melanotic sarcoma; radical operation. Operated November, 1911, reported January, 1912, in excellent health, with no signs of recurrence, but considerable deformity owing to the operation.

SARCOMA OF THE NOSE.

Dighton, A. Brit. J. Surg., 1913—I—207.

Reports one case operated with good immediate results. No report on later result.

OPERIERTER FALL EINES IN DIE LINKEN NASENNEBENHOHLEN SICH ERSTRECKENDEN SARKOMS.

Safranek, J. Pest. Med. Chir. Presse, 1913—XLIX—93.

Reports one case of nasal sarcoma; radical operation; immediate results good. Later results not reported.

NASOPHARYNGEAL MYXOSARCOMA; SEVERAL OPERATIONS AND FINAL SPONTANEOUS RECOVERY.

Ingals, E. F. Ann. Otol., Rhinol. and Laryngol., 1914—XXIII
—373. Also in Am. Laryngol. Assoc. Trans., 1914
—XXXVI—164.

Essential facts indicated in title. Patient seen twenty years after last operation, tumor had disappeared, but nasal septum was bent to the left, there was large cavity in the right naris, right cheek was prominent, and right eye blinded.

SARCOMA ORIGINATING IN THE FLOOR OF THE RIGHT MAXILLARY ANTRUM TWO YEARS AFTER OPERATION.

Waggett, E. B. Royal Soc. Med. Proc., 7; Laryngol. Sect., 1913-14, 189.

Growth involved left antrum, nose and hard palate; operation, free removal; no recurrence in three years.

CASE OF SPINDLE CELL SARCOMA OF THE ACCESSORY SINUSES.

Canfield, R. B. Journ. Mich. Med. Soc., 1915—XIV—523.

One case that had been operated intranasally without relief; large growth in nasal sinuses removed by radical operation. Good operative result; no later report.

SARCOMA OF THE NASOPHARYNX.

Dorr, R. C. Southern Med. Journ., 1915—VIII—233.

Giant cell sarcoma in young girl; tumor removed without radical operation; several recurrences, removed in similar way; since last operation no recurrence for "nearly two years." Patient's general health excellent.

SPINDLE CELL SARCOMA OF THE NASOPHARYNX.

Orton, H. B. Laryngoscope, 1915—XXV—709.

Operated with temporary improvement; recurrence of symptoms and treatment with Coley's serum, resulting in disappearance of nasal tumor and reduction in size of glands in the neck.

PRIMARES LYMPHOSARKOM DES NASENRACHENS.

Oppikofer, E. Cor. Bl. f. schweiz Aerzte, 1916—XLVI—1177.

Reports two cases of lymphosarcoma of the postnasal space. (1) Man, 72 years old; operated; recurrence and death two years later due to apoplexy, not the tumor.

(2) A man 40 years old; several recurrences and operations; final operation followed by large doses of arsenic; no recurrence in seven years.

Also mentions one other case of round cell sarcoma operated; arsenic treatment; recurrence and death from pneumonia in a year.

SARCOMA OF THE RIGHT MAXILLARY ANTRUM. MOURE'S OPERATION.

Moore, L. Royal Soc. Med. Proc. 10; Sect. Laryngol., 1916-17, 29.

Sarcoma originated from right ethmoid region; Moure's operation; report six weeks after operation, nose clean and healthy.

ROUND CELLED SARCOMA OF RIGHT MAXILLARY ANTRUM, ETHMOID AND NASAL CAVITY. MOURE'S OPERATION.

Thomson, St. C. Royal Soc. Med. Proc. 10; Sect. Laryngol., 1916-17—58.

Author says: Removal "may be incomplete," but the single incision gives great advantage. Report two months after operation, no recurrence.

SARCOMA OF THE NASAL SEPTUM.

Goldstein, M. A. Ann. Otol., Rhinol. and Laryngol., 1917—XXVI—1146. Also in Am. Laryngol. Assoc. Trans., 1917—XXXV—263.

One case; operated; recurrence after one month.

CASE REPORTS.

1904 TO DATE.

II. CASE TREATED BY RADIUM, X-RAY, ETC.

(ARRANGED TO DATE.)

TWO CASES OF SARCOMA.

Riddell, J. R. Glasgow Med. J., 1905—LXIV—280.

One case sarcoma of nose (left nostril); treated with X-rays until tumor was reduced in size about one-half (September 1 to November 10, 1902). Remainder of growth removed (April, 1903); stump treated with X-rays till August 15, 1903. Patient dismissed cured. No later report.

One case sarcoma of nasopharynx ("occupying whole postnasal space"). Treatment with X-rays began on June 7, 1904, and continued until June 10, 1905. No attempt at removal, but small piece taken for diagnosis. "The case appears to be well."

CASE OF INTRANASAL SARCOMA.

Aufmwasser, H. Laryngoscope, 1908—XVIII—658.

One case sarcoma of nose, repeated recurrences after intranasal operation; after removal by snare and curette in March, 1904, patient was given X-ray treatment; another recurrence in September, 1904, removed intranasally, followed by X-ray for two weeks every other day. No further trouble. General health good and no symptoms of recurrence, November 1, 1901—three years.

TREATMENT OF SARCOMA OF THE NASOPHARYNX BY INJECTIONS OF ADRENALIN.

Rhodes, J. E. J. Am. M. Ass., 1906—XLVII—430. Also in Am. Laryngol. Assoc. Trans. 1906, 173, and in Ann Otol., Rhinol. and Laryngol., 1906—XV—444.

Reports one case of sarcoma of the nasopharynx treated by injection of adrenalin; sarcomatous mass was reduced in size and pain alleviated. In spite of local improvement, patient died of general weakness and toxemia. Author recommends this method for inoperable cases only, as a palliative measure, not as a cure.

This case is included in Farrell's summary, 1911. (See General Discussions and Collections of Cases.)

NASAL SARCOMA.

Chappell, W. F. Am. Laryngol. Assoc. Trans., 1912—XXXIV—286.

Report of a case that improved temporarily with use of Coley's serum; after temporary improvement tumor began again to enlarge; a mastoiditis intervened and was operated. Marked improvement was noted after this, tumor disappearing almost entirely. "It has been suggested that during his attack of suppurative mastoiditis a vaccine was manufactured which, in part, destroyed the growth." A few months later tonsils and adenoids were removed, and the patient's general condition was not so good. Symptoms indicated that the nasal growth had increased in size. No further report.

SARCOME NASOPHARYNGIEN GUERI PAR L'ELECTROCUPROL.

Jacques. Rev. méd. d. l'Esnt., 1913—XLV—407.

Reports one case of sarcoma of the nasopharynx operated, in which tumor recurred and was treated by twelve gluteal injections of colloidal copper. After the twelfth treatment the tumor had entirely disappeared, leaving only a scar at the site of the operation. No later report.

CASE OF SARCOMA OF THE NASOPHARYNX TREATED BY RADIUM EMANATIONS.

Hastings, S. Royal Soc. Med. Proc. 7; Laryngol. Sect., 1913-14—33.

Sarcoma filled nasopharynx. Tube equal to 82 mg. radium bromide inserted through a small incision in soft palate, left in place sixteen hours. Symptoms improved in five days. Treatment on August 25, 1913; patient well; no sign of growth and slight scars December 5, 1913.

CASE OF SARCOMA OF THE NASOPHARYNX TREATED BY RADIUM EMANATIONS.

Martineau, A. J. Royal Soc. Med. Proc. 7; Laryngol. Sec., 1913-14, 32.

Tumor on left side of nasopharynx. Four X-ray treatments previously. Tube of radium (= 47 mg.) inserted through nose retained 24 hours. Growth diminished in four or five days. About two months later no visible growth and surface healed.

CASE OF SARCOMA OF THE NASOPHARYNX TREATED BY RADIUM EMANATIONS.

Tilley, H. Royal Soc. Med. Proc. 7; Laryngol. Sect., 1913-14, 31.

The tumor filled the nasopharynx. Two radium emanation capsules each containing equivalent to 40 mg. radium bromid inserted into anterior surface of growth, left for 24 hours. Whole mass disappeared in a week. In a month patient feeling well; only one small gland palpable under left ramus of jaw.

In the discussion Dr. Tilley says that he did not claim that the case was "cured" but six weeks before the case seemed hopeless, while at the time of the report "anyone might think he was normal." He did not think such a result could be obtained by any other method.

SARCOMA OF NASOPHARYNX.

Patterson, N. Royal Soc. Med. Proc. 9; Laryngol. Sect., 1915-16, 61.

One case, six X-ray treatments through mouth, tumor disappeared, but later radium applied through postnasal space. X-ray applications to neck; also operations on enlarged glands followed by X-ray. Last treatment July 29, 1914. February, 1915, no signs of recurrence.

SARCOMA OF THE NASOPHARYNX.

Lewis, A. C. J. Tenn. Med. Assoc., 1916-17—IX—461.

Reports one case sent to Johns Hopkins Hospital for radium treatment, improvement reported, "with a good chance of recovery."

CASE OF NASAL SARCOMA CURED BY RADIUM.

Stein, O. J. Illinois M. J., 1917—XXXII—299. Also Ann. Otol., Rhinol. and Laryngol., 1917—XXVI—782, 892.

Sarcoma originating from right ethmoid region; treated by radium; patient died a few weeks after last examination from perforated appendix; autopsy showed no sign of tumor in the nose or nasopharynx and no metastasis.

Dosage: First dose, 100 milligrams of radium applied for five hours on three consecutive days; nineteen days later same amount for six hours each day; thirty days later, 50 milligrams for four hours; sixty days later, 50 milligrams for six hours, on two consecutive days. Radium also applied to large glands on side of neck.

In the discussion Dr. Woelfel claimed that sarcoma of the upper air passages is peculiarly susceptible to radium, but did not report any cases.

SARCOMA OF THE ETHMOID.

Moschowitz, A. V. Ann. Surg., 1918—LXVII—67, 621.

Author reports two cases of sarcoma of the ethmoid operated; results excellent; no recurrence in sixteen months in one case, in "almost a year" in the second case. In the discussion, Dr. Green reported a case of sarcoma arising on the horizontal plate in the frontal bone on the right side; operation; same condition on left side in a few months; operation; recurrence on right side; deep X-ray treatment; tumor decreased in size, but toxemia caused death.

Dr. Meyer reported a case of Dr. Pfahler's, sarcoma of the orbit, treated by X-ray; tumor much decreased in size, eyeball receded and vision good.

XLIV.

A NEW TONSILLECTOMY TECHNIC

By Bertram C. Davies, M. D.,

Los Angeles.

There are three requisites necessary for a successful technic for tonsillectomy: 1. There must be no damage to the pillars or contiguous tissues, avoiding thereby unnecessary hemorrhage and deformity; 2. The tonsil removal must be complete; 3. The time required must be short, obviating shock, which is important, especially in children.

A technic based on anatomic relations which covers these three requisites will satisfy every requirement. With these considerations in view, and disregarding the mechanical devices intended to remove all dangers and difficulties of the operation, the writer dares to offer a very simple, safe and uniformly effective technic, which his own experience with that of others has proved satisfactory.

The instruments necessary are: Mouth gag, tongue depressor, tonsil tenaculum, scissors tonsil snare, sponge holder. The technic is based on the attachment of the tonsil to the pillars. Loeb says: "The tonsil is surrounded by the pharyngeal aponeurosis which is rather loosely associated with the capsule." Next to this is found the superior constrictor muscle, the invasion of which together with the pillars accounts for so many socalled adhesions.

The separation of the tonsil from the pillar, because of its loose attachment, does not require the use of a sharp instrument: it is accomplished much more easily when perfect control of a semisharp instrument can be maintained. The writer has therefore utilized a pair of Seiler's turbinal scissors in which the backs of the blades have been beveled to a semisharp condition so as to produce a more than dull dissection without cutting.

In children and nervous adults, the gag is adjusted under general anesthesia, the tongue depressed and the tonsil grasped with the tenaculum, the upper blade being passed well over the superior pole of the tonsil, the lower blade being passed well down under the inferior pole, and the instrument closed. The tenaculum handle is then pressed over into the opposite angle of the mouth, at the same time making slight traction forward and toward the median line. The tongue depressor may now be dispensed with, the tenaculum handle serving this purpose. The anterior pillar is now on the stretch over the tonsil, the entire outline of the organ being visible.

The scissors are now introduced (Fig. 1), the points, blades closed, passing between pillar and capsule at their junction in the upper third. In this position the points are passed outward to the base of the tonsil, no force being necessary and then opened about one-half inch, from which position the lower blade being fixed, the upper blade is made to travel over the top of the tonsil, describing an arc extending down one-third of the posterior pillar.

The scissors are now closed, being held in position, and the lower blade moved downward, while the upper blade is fixed at a point on a level with the inferior pole of the tonsil. (Fig. 2.)

Exercise at this time of slightly increased traction inward and forward will "deliver" the tonsil, and it now stands out of its fossa and anterior to the anterior pillar. The snare is adjusted and the entire tonsil is easily and quickly removed, carrying with it nothing but its own capsule and leaving a shining and uninjured aponeurosis.

The operation is rapid and in a large proportion of cases practically bloodless, sponging in the hands of the writer being rarely required.

Under local anesthesia (novocain, 1 per cent. injected between capsule and pillars) this particular technic renders the operation painless, with a minimum of postoperative pain and tissue reaction.

The first step in the technic, that of beginning the dissection, is of much value to open a peritonsillar abscess, being practically always effective in locating the pus cavity. There is no laceration of tissue, as in incising the pillar several times in the endeavor to strike pus and a subsequent tonsillectomy is not complicated by consequent adhesion between the capsule and the pillar.

It is true this technic approximates the average dull dissection, but the substitution of the scissors, altered as described, together with added manipulation of the tenaculum, makes it much easier and quicker.

The technic renders unnecessary the purchase of a new instrument of more or less doubtful value, but is accomplished with such instruments as the average otolaryngologist has in his case.

No assistant is necessary, the instruments are few and no interchange is made during the operation.

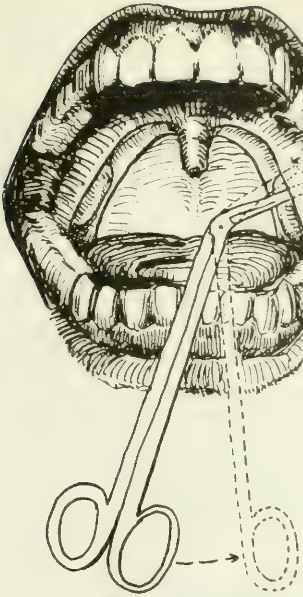

Figure 1.

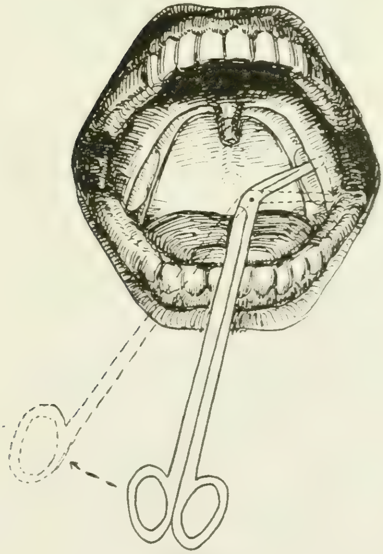

Figure 2.

XLV.

TUBERCULOMATA OF THE LARYNX.

By J. A. Pratt, M. D., F. A. C. S.,

INSTRUCTOR OF OPHTHALMOLOGY AND OTOLARYNGOLOGY,
UNIVERSITY OF MINNESOTA.

Tuberculous tumors of the larynx are one of our rarest of tubercular manifestations. They are generally situated in the ventricles, but can be found on other parts of the vocal box. The patient first presents himself to be relieved of hoarseness and complains of little else, even when the tumors are very large, as in the case reported. The physical signs of tuberculosis are usually absent, if the patient is seen in the beginning hoarse stage and the diagnosis is made with the microscope.

The picture of the one I have seen reported and the one I am reporting were very similar. The tumors were of the lobular variety, growing from the ventricles on each side, not interfering with the cords or rim of the glottis, and of a smooth, brittle, nonulcerating type. Neither case showed any physical signs of tuberculosis at the time the diagnosis was made.

Mr. M. M., age 28, came to the office September 19, 1918, complaining of laryngeal trouble, slight dyspnea, hoarseness but practically no pain. There was free movement of the larynx and no enlargements of the lymph glands. Upon examination nearly all the epiglottis was gone and the edges healed. The larynx above the cords was filled with seemingly four growths attached to the ventricles and nearly reaching to the center. These growths were slightly rough, pale in color, and cartilaginous to the touch and brittle, as was demonstrated when a piece was removed for examination. The patient first noticed trouble with his throat in the spring. He had his lungs examined and was pronounced negative. He worked all summer at his usual occupation of grain elevator constructor. On account of the suspicious appearance of the growths, he was returned to his physician with instructions to have a Wassermann made and to be given an injection of neosalvarsan at once. After the neosalvarsan injection he claimed his throat never felt so well and he left for a week's fishing trip. His Wassermann was reported negative. He returned with an increase in weight of seven pounds, feeling fine and the growths seemed smaller, and where the piece was removed it was entirely healed. At this time the report came from the pathologist that the specimen submitted was tuberculous tissue and a diagnosis of tubercular tumors of the larynx made.

At this time, in October, he was presented before the Minnesota Academy, as tubercular tumors of the larynx, but the negative appearance of the patient brought forth the discussion that it might be malignant, benign, syphilitic or a combination. The patient gradually failed and died February 1, 1919, of general tuberculosis of the lungs, with large cavities.

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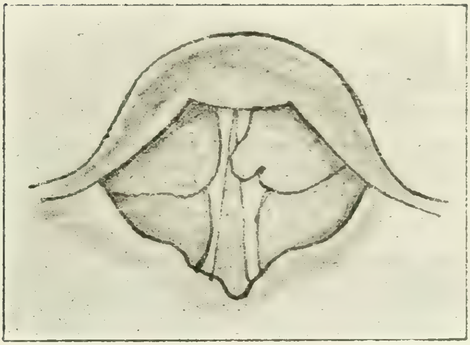

Appearance of the larynx at the time of the original examination.

XLVI.

THE REPORT OF A CASE OF CHRONIC SUPPURATIVE OTITIS MEDIA WITH INTERESTING LABYRINTHINE SYMPTOMS AND OPERATIVE FINDINGS.*

By John Randolph Page, M. D.,

New York.

The question when is it advisable to invade the labyrinth in a radical mastoid operation has prompted the following case report with a few brief references.

On August 26, 1919, a boy nine years of age was brought to Dr. Duel's clinic at the Manhattan Eye, Ear and Throat Hospital complaining of headache, dizziness, vomiting and pain in his right ear. He looked sick and emaciated and had a tendency to fall to the right when he attempted to walk alone.

Beyond noting a foul discharge through a low central perforation in the drum membrane of his right ear, nystagmus to the right and total loss of hearing in the ear, no further examination at this time was made. He was admitted for observation as a case of "O. M. P. C.," mastoiditis and acute labyrinthitis," and strict orders were given for rest in bed and cleansing of the ear with as little disturbance to him as possible.

The history obtained was that since an attack of scarlet fever three years before he had had an intermittent discharge from the right ear, that four weeks before, at a time when there was no discharge from the ear, pain had developed, and when he turned his head from right to left he felt dizzy and would frequently vomit. This occurred several times a day, so he was treated for stomach trouble by his family physician until he was brought to the hospital because of the discharge from the ear which had developed with a recurrence of pain only four days before. His temperature on admission was normal, the leucocyte count 9600 with 66 per cent polynuclear neutrophiles. Within twenty-four hours his pain had left and his symptoms had so far subsided that it was difficult to keep him in bed, although the nystagmus still persisted and on sitting up he was unsteady. He did not vomit after his first night in the hospital, and after eight days of normal temperature he gradually regained his equilibrium and was allowed to go home with instructions to return in six weeks for operation on the diseased mastoid.

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*Read before the American Otological Society in Boston, Monday, May 31, 1920.

The tests at this time showed a completely dead labyrinth except that there was still a slight nystagmus to the diseased ear, a Weber to that side and a slight indefinite disturbance on suction in the fistula test but none on compression. Irrigation of the ear with ice water for five minutes produced no effect, and the noise apparatus revealed total deafness.

On his return seven weeks later, with the noise apparatus in his good ear, he heard a moderately loud voice at arm's length, had a slow but positive caloric reaction in one minute and twenty-four seconds, his Weber lateralized to the right or diseased ear, and the House Surgeon recorded after rotation to the right in the horizontal plane an after nystagmus of 16 seconds, and on rotation to left an after nystagmus of 26 seconds, which seems likely to have been an error of record and the reverse to have been the case.

The condition in the tympanum warranted a radical mastoid operation, which when performed revealed a mass of cholesteatoma over the horizontal canal and region of the oval window. The crest of the canal was eroded but it could not be definitely determined, without the dangerous use of a probe, whether or not a fistula existed, though slight pressure with moist cotton pledgets over this area caused no movement of the eye. Because of the excellent function, further interference in this locality was carefully avoided. On removing the cholesteatoma from the region of the oval window its membrane was seen to follow the surface of the inner tympanic wall in its upper posterior part and dip into the oval window recess leaving the stapes plainly in view. In demonstrating this to some students the capitulum was touched with a small probe and the bone fell over loosely, intact but not completely dislocated, leaving its seat in the window covered with the white membrane of the cholesteatoma. The dangerous communication with the labyrinth that is usually established by such an accident was in this case prevented by the disease. No disturbance whatever of the labyrinth was noticed and the next day the hearing was noticeably improved and the caloric response to a cold solution was active and almost immediate. An uneventful recovery, with a thinly dermatized and dry middle ear cavity, was obtained.

Examination on April 3, 1920, after an absence of several months, showed no accumulation of epithelium in a cavity that was perfectly dry with the oval window in plain view.

Functional test was as follows:

Weber referred to the right (operated) ear.

Rinne negative in right ear, positive in left ear.

Bone conduction increased in right ear, slightly increased in left ear.

Lower tone limit, 38 d. v. in right ear, 26 d. v. in left ear.

The 2048 fork was heard equally well in both ears but about 2 seconds minus in both.

The upper tone limit was 1½ Galton in both ears.

Acoumeter 3 ft. in right ear, 15 ft. in left ear.

Whisper (numbers) 15 ft. in right ear, 25 ft. in left ear.

Whisper (confusing words such as "telephone" followed by "thirty-four" 4 ft. in right ear.

With the noise apparatus in left ear, he heard a moderately loud voice at 30 ft. in right ear.

Rotation to right after nystagmus 30 seconds.

Rotation to left after nystagmus 26 seconds.

After the skin over the oval window was softened with oil, hearing for the acoumeter improved from 3 to 6 feet and whisper from 15 to 31 feet.

Had this case been operated on shortly after the acute symptoms of labyrinthitis had subsided, say two weeks after, when the caloric test was negative and the hearing absent, the dictum (made in Germany) that a radical mastoid operation should not be performed on an ear with a dead labyrinth without the labyrinth itself being opened to provide an outlet for any inflammatory effusion that might be set up within it by the traumatism of the operation would very likely have influenced us to open the vestibule and cochlea, particularly when we considered the erosion of the horizontal semicircular canal, as this is what we did do in a similar case where the hearing and caloric reaction had not returned after the acute labyrinthitis had subsided.

Would the hearing in this similar case have returned if we had waited longer, or had in operating confined ourselves to the middle ear and mastoid? I think not, for while in both cases there was total loss of hearing and caloric reaction there was in the subject of this report along with the total deafness and negative caloric still a nystagmus to the diseased ear and a slight disturbance on suction in the fistula test, which was not the case with the previous patient, and which emphasizes the importance of not omitting these tests. The Weber also was lateralized to the diseased ear, but it will be recalled that Richards had a case in which the Weber was lateralized to the side on which the labyrinth had been removed.

In regard to the dictum referred to, some respect is lent to it by two cases of Dr. Kerrison which in his absence came under my care. Both had dead labyrinths and the radical mastoid operation had been performed on both without the labyrinths being opened. Tests had shown them to be functionally dead but at operation there was nothing found in either case to lead one into the labyrinth, so neither labyrinth was opened. Neither cavity showed any inclination to dermatize despite careful dressing, and in one case re-operation. This case later developed a cerebellar abscess and died. The other disappeared, probably discouraged by the prolonged delay in healing.

In the three labyrinth cases referred to by Dr. Bowers before the New York Academy of Medicine, Section on Otology, March, 1920, all of which were acute, he operated on two before the labyrinthine symptoms had subsided, opening the labyrinth in one and doing a simple mastoid on the other, the third he let alone, which in our opinion is what he should have done in all three cases, at least until the acute labyrinthine symptoms had subsided and time had been allowed for the communications with the meninges to become sealed off. This also is his subsequent opinion in regard to his first case, for obviously all possibility for the return of hearing in it was destroyed by the operation on the labyrinth, yet this labyrinth was no more dead to sound or caloric stimulation than was the one in the subject of this report in which both functions returned. Reference to the other tests was not made in his case except to say that the labyrinth did not respond to stimulation.

Neither Dr. Dench nor Dr. Richards (John D.) have been influenced by the German dictum. The former is not impressed by the suggestion that latent infection exists in a labyrinth forever simply because it is dead functionally; and the latter is convinced after opening several dead labyrinths of long standing that while they remain functionally dead the communication between them and the meningeal fluid often becomes reestablished and no macroscopic difference in the appearance of the dead and the normal labyrinth can be detected on opening them.

The conclusions reached are that aside from a myringotomy, where it is necessary, operative interference in cases of acute labyrinthitis is contraindicated until the acute symptoms have subsided, except in extraordinary cases where other symptoms have developed which necessitate operation on the mastoid or sinus, or where in beginning meningitis it is thought advisable to sacrifice all hope of returning function to the advisability of promoting drainage through the labyrinth.

And secondly, since we are unable to determine whether an attack of labyrinthitis is of a serous or purulent nature, no prognosis regarding the return of function can be made until ample time for its return has been allowed. And further, in cases of chronic purulent otitis media which require operation in the presence of a dead labyrinth the decision whether or not to open the labyrinth depends on the exigencies of each individual case, and while one may be led to open the labyrinth by disease of its wall, or by the history of a comparatively recent attack of presumably purulent inflammation which may have sealed off the communications with the meninges but left the vestibule and cochlea full of pus, he may on the other hand, in a case of long standing, by invading the labyrinth, open a cavity that has long since ceased to be a menace, and thereby unnecessarily open an avenue for infection of the meninges.

127 East Sixty-Second St.

XLVII.

DIRECT LARYNGOSCOPY.*

By Stanton A. Friedberg, M. D.,

Chicago.

In any special technical procedure, the field of work in so far as definite indications are concerned, is more or less limited. This may account for the fact that the practical value of direct laryngoscopy has not been accorded the recognition it deserves. When we stop to consider that it is the only method whereby a satisfactory view of the larynx may be obtained in infants and children, it is difficult to understand why it has not been more universally adopted. To one who has acquired the necessary technic and skill, the procedure is less difficult than the attempt to obtain a view of the larynx in a frightened and struggling child. Even though a mirror could be introduced, the peculiarities of the epiglottis with its flaccidity and tendency to curl, often prevents more than a glimpse of a limited part of the larynx. Furthermore, when general anesthesia is used in indirect laryngoscopy the result is apt to be quite as unsatisfactory and, in addition, the increased element of danger must be taken into consideration. The direct method, by which the epiglottis may be held away from the laryngeal aperture gives a more extensive view with a better comprehension of the diameters and proportions of the larynx than one can obtain from the image reflected in the mirror. Furthermore, the examination can be carried out without anesthesia, either general or local.

Indications: Any laryngeal or tracheal condition of obscure or uncertain origin or development is sufficient to warrant a direct examination. In a few instances, more particularly in the accidents due to foreign bodies, a history of etiologic value may be obtained. In general, however, attention is directed to the larynx by the symptoms of hoarseness or complete aphonia of either gradual or sudden onset. There will be cough, stridor or dyspnea of varying degrees. Pain, difficulty in swallowing and certain constitutional symptoms may also be present. Any one or a number of these symptoms may be due to a foreign body, perichondritis, papillomata, congenital or acquired stenoses, malformations, supraglottic or subglottic edema or infiltration, membrane formation, abscess or traumatism. It is not uncommon for a number of these conditions to be diagnosed under the comprehensive term of croup. With others, diphtheria is suspected and antitoxin administered without any resulting benefit. Whenever there is any reason for doubt, a culture, uncontaminated by oral secretions, may be made directly from the larynx and trachea.

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*Read before the Chicago Laryngological and Otological Society, October 6, 1919, in a Symposium on Indirect, Direct and Suspension Laryngoscopy.

In addition to the aid in diagnosis, the direct method offers unequaled facilities for certain operative procedures. As an aid in the introduction of the bronchoscope, it is indispensable. In conjunction with smaller sized endoscopes, it has made it possible to do bronchoscopy by the upper route in the youngest of patients. The removal of foreign bodies above, between or below the vocal cords, may be done under direct vision, thus obviating the dangers of traumatism or of forcing the offending substance deeper into the air passages. Papillomata and granulations may be cauterized or removed, stenoses dilated and treatment applied to areas of ulceration. Intubation and extubation may be done quite satisfactorily under the guidance of the eye. The former, however, is not any more easily performed by this method than in the ordinary way. In extubation, it is much more advantageous. The writer has, on several occasions, removed intubation tubes that had been forced into the trachea in the attempt at extraction in the usual manner. In the relief of this accident, the only recourse formerly was opening the trachea. A comparison of the two procedures strikingly emphasises the value of the direct method.

Contraindications: Although there are no absolute contraindications, certain conditions will require the exercise of extreme caution in making the examination. Chief among these are high grade dypsnea, uncompensated heart lesions, myocarditis and extreme weakness due to prolonged respiratory obstruction. In the markedly dyspneic patients it is safer to perform tracheotomy and then make the direct examination. In some patients, depending upon the cause and nature of the obstruction, the insertion of a bronchoscopic tube through and beyond the swollen area may bring about relief. It cannot be too strongly emphasized that no attempt should be made to examine a highly dyspneic patient unless complete preparations have been made for bronchoscopy and tracheotomy.

The direct method may be extremely difficult or impossible to carry out in anchylosis of the jaws and possibly in some deformities of the cervical spine. Alveolar, peritonsillar, or retropharyngeal abscess may also temporarily prevent an examination.

Technic: The picture obtained by the direct method of examination is entirely different from that which is ordinarily seen in the mirror. The color, size, general perspective and relationship of the parts of the larynx do not conform to the descriptions as found in text books on laryngology. This apparent lack of agreement is due to the fact that almost all that has been written concerning the larynx was based upon the image as it appeared in the mirror. Unless one is familiar with the natural difference between the indirect and direct view, an examination will be unsatisfactory and the conclusions drawn quite likely will be incorrect.

Certain landmarks must be recognized and their relationship to the surrounding structures fully appreciated in order to avoid dangerous bungling. One of the most important guides is the epiglottis. Ordinarily the recognition of this structure would not be considered difficult but, in infants, it is pale, very small and soft, difficult to hold and is quite easily displaced. This displacement is favored by the mobility of the adjacent structures. Difficulty in recognition will also be increased by the presence of an excess of secretion, and also by movements of the throat due to gagging and coughing. Some help may be obtained in older children by having the tongue held out, thus elevating the epiglottis and bringing it more readily into view. The rounded eminences of the arytenoid cartilages are the next important landmarks. Inflammatory conditions will at times make them difficult of recognition. The aryepiglottic folds, vocal cords and glottic lumen are not of any assistance as guides until the epiglottis is held away from the laryngeal aperture and the usual spasm of the muscles of the larynx subsides. After the arytenoid cartilages have been defined, the posterior commissure may be recognized and the mucous membrane inspected down to the upper portion of the posterior wall of the trachea.

Children should be examined in the recumbent position. The head should be held and prevented from rotating by a capable assistant. Movements of the trunk and limbs should be controlled by another assistant or nurse. The tip of the laryngeal speculum is introduced and carried downward over the base of the tongue. For ordinary examinations, the speculum may be held in the right hand. It is highly necessary that equal proficiency in its introduction be acquired with either hand. This is especially the case where operative manipulations require the free and unlimited use of the right hand. Changing from one hand to the other while the speculum is in place will usually allow the epiglottis to slip away from the end of the instrument. The necessary readjustment will add just that much more time to the examination. Furthermore, if there is any inflammatory condition involving the supraglottic area, this will undoubtedly be increased by the additional instrumental manipulation. Adults may be examined either in the upright or recumbent position. However, in suspected foreign body cases, the latter is much the safer as it permits the head, neck and trunk to be placed in a downward inclined plane. In case the foreign body is dislodged, it is then less likely to enter a lower part of the respiratory

After the tip of the epiglottis has been recognized, the end

tract or esophagus.

of the speculum is passed over its upper margin and then, with a lifting motion, slightly downward over its laryngeal surface. The depth to which it is passed necessarily will vary according to the age of the patient and the size of the epiglottis. In general, just enough of the tip should be held to prevent the epiglottis from slipping away. This will allow the prominences of the arytenoid cartilages to come into view. If the end of the instrument is introduced too far downward the arytenoids will be overridden and the pyriform sinuses and mouth of the esophagus entered. Having exposed the arytenoid landmarks, the tip of the speculum is carried a little farther downward along the surface of the epiglottis at the same time increasing the pressure upward. This elevates the base of the tongue, the hyoid bone and its attached muscles and produces a wider exposure of the laryngeal aperture. The posterior commissure may be recognized, the false cords, and after a moment or two, allowing the laryngeal spasm to subside, the glottic lumen and the true cords. On deep inspiration the rings and posterior wall of the trachea may be seen sometimes as far down as the bifurcation.

The anterior portion of the larynx, especially the commissure, is the most difficult to bring into view. Slight changes in the position of the head combined with external pressure over the thyroid cartilage will be sufficient in most instances to expose this region.

During the introduction of the speculum, the upper lip should be held out of the way to prevent it from being caught between the instrument and the teeth. Pressure against the latter must be avoided, as nothing is accomplished thereby and injury to the teeth is apt to be the result. For the exposure of the larynx, the only pressure or lifting force of value or consequence is that which is derived from the end of the speculum directed against the displaceable soft parts. In the recumbent position the force is directed upward. With the patient seated, the direction of pressure is forward. Any unusual difficulty in exposing the larynx may, as a rule, be traced to an incorrect position of the head. For the ordinary examination anesthesia in children, either general or local, is usually unnecessary. It increases the time, introduces an additional element of danger and offers no advantage in so far as the position and control of the patient are concerned. In adults in all but a few patients, a local anesthetic will suffice.

Owing to the size of the larynx in very young patients, carefulness and gentleness are required in order to avoid traumatism. This caution is more than ever necessary if any obstruction to respiration will produce an edema. In order to lessen the danger of increasing the swelling or congestion of the supraglottic structures, the writer has varied the usual procedure in exposing the larynx. Instead of holding the tip of the epiglottis with the end of the speculum, the latter is inserted deeply into the space between the base of the tongue and the epiglottis. By exerting the required lifting force upon the tongue the epiglottis, by reason of its attachments to the latter, is placed on the stretch and is pulled away from the laryngeal opening as the tongue is moved upward. Not only is it possible to obtain quite a satisfactory view of the larynx but the bronchoscope may be introduced with the same facility as in the other method. The only advantage in exposing the larynx in this manner lies in the avoidance of traumatism to the supraglottic structures already involved in an inflammatory reaction or in an edema.

It is hardly possible to compare the simple direct with the suspension method of laryngoscopy. The latter supplements the former. For the introduction of the bronchoscope and for diagnoses in children, the simple method meets practically every indication as it is possible to carry out the procedure quickly and without anesthesia. It wil lalso be satisfactory in certain operative procedures. Where a prolonged operation is necessary and where the free use of both hands is required, the suspension method must be the method of choice.

XLVIII.

SUSPENSION LARYNGOSCOPY AS A MEANS OF DIAGNOSTIC AND OPERATIVE APPROACH TO THE LARYNX.*

By R. C. Lynch, M. D.,

New Orleans.

It has been just five years since my first introduction to you upon this floor when your chairman so graciously extended to me that privilege; two years later, I happened in at one of your meetings and again took part in your proceedings. It is, I assure you, a real pleasure to come this time deliberately for the purpose of taking part in the symposium which your chairman has so considerately arranged, and I wish to take this opportunity of extending my sincerest thanks to each of you for this privilege.

I have discussed suspension laryngoscopy from many standpoints and I have begun to feel that the subject was about exhausted and it was on this account only that I expressed some doubt that the subject was about worn out; but, when your chairman proposed this symposium, I felt that it would be an opportunity to exchange our views and gather the proper fields and limitations of each department, and this more so because of the splendid atmosphere which I know from the past prevails among you.

Suspension laryngoscopy as a diagnostic means of approach to the larynx has its field of usefulness without doubt; but on account of the necessity for its use, one readily understands that it has no place as a routine procedure; but, by its use certain data can be gathered which furnish that refined type of information that leads to most accurate diagnosis. This cannot but help in the more complete and ultimate care of the special condition under observation. For instance, in the diagnosis of tumors, suspension permits the two handed palpation carried out in a manner as delicately and accurately as if the larynx were laid upon the surface of the body. While color, vascularity and probable point of attachment can be seen by mirror and spatula, it takes in most instances two hands to gain accurately the size, consistency, and actual point of origin of the tumor mass; and, in the case of large benign tumors and especially the malignant tumors, the extent of involvement and amount of induration can only be determined under two-handed manipulation which is afforded only by the aid of the suspension apparatus.

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*Read before the Chicago Otolaryngological Society, Oct. 6, 1919.

Points of vital interest to the surgeon in determining the type of operative procedure best suited for the case are also determined by this means; as an example: A fat Italian woman was examined on account of hoarseness from which she had suffered for many years. With a mirror one saw the typical picture of small fibromata at the nodal points on both vocal cords; they were apparently alike in consistency and point of attachment. Under suspension, however, on the left cord were found two small retention cysts occupying the superior surface of the vocal cord possibly a millimeter from its free margin. On the right cord the mass was soft and flabby, not cystic, and was seen to grow from the inferior surface of the vocal cord. On the left side the cysts were opened, the walls curetted and the sacs cauterized with trichloracetic acid; on the right side the tumor was removed by dissection and found to be adenoma, so that the original diagnosis of fibroma was decidedly inaccurate, and the operative procedure different for the two cords.

In the instance of malignant tumors especially, is suspension most valuable. By mirror we see one-half or one-third of the larynx involved and are only privileged to look down upon the tumor from its superior surface. If the individual throat is sufficiently quiet and the psychology of the patient proper, we may even determine that possibly the subglottic space is involved. The same is true of the spatula, but under suspension, we can determine the depth of the infiltration and its mobility, and we can hold the mass aside and gain sufficient room to see the extent of involvement below the vocal cords. Furthermore by piercing the cricothyroid membrane with a small straight needle, we can accurately measure the extent of its approach to this outlet for the general sympathetic involvement, and we can more accurately palpate the apparently normal side to determine its freedom or involvement; and, with all of this information only, can we best advise this patient as to the best means for his relief from this dreaded malady. If the anterior two-thirds of one vocal cord is involved in malignancy and the induration does not extend down to the perichondrium of the thyroid cartilage, then the case is suitable for removal by suspension, and I have done this successfully seven times. By this I mean without recurrence. If the arytenoid joint is involved and is fixed, it means an involvement of the perichrondrium and thyrotomy is more desirable. If the anterior half of the larynx is involved and we have determined that the extension is not beyond or near to the cricothyroid membrane, this may be completely removed by suspension and without the necessity of cutting through the cartilaginous box and therefore open a way for general involvement. If the posterior half is involved, the prognosis is bad by any procedure except total extirpation and we can determine by suspension the probable induration of the esophagus. If this be involved, it is considered decidedly extrinsic and the prognosis is bad.

To determine all of this it is necessary to have two hands free to work, and the accuracy of the extent of involvement can only be appreciated after you have put it into practice. I would like to show you a specimen which illustrates these views very well. I do not believe one studies the delicate movement of the vocal cords nearly as well under suspension as by the other means, for the tension which is necessary to a proper view, while not now so great, still is too much to permit of their free movements. In infants and very young children, however, it seems more useful than the spatula because of the broader view and one can relieve the pathologic state if one is found to exist.

Suspension offers as simple a means of viewing the larynx especially in children for the acute conditions, as does the spatula. I refer particularly to the differential diagnosis of catarrhal subglottic laryngitis as against laryngeal diphtheria, and it has the additional advantage that if intervention is necessary this can be practiced most accurately under suspension.

For the diagnosis of vocal nodules and their removal if desired, especially in infants and young children, suspension is invaluable. As my experience increases, I find many more of these conditions than I had previously realized. While the upper two-thirds of the trachea is well within the view under suspension, I have had no occasion to use suspension for diagnosis here that could not be made by simpler means. It has not been my good fortune to see many tumors of the trachea. The broad field of view under suspension offers an intimate study of the function of the middle and inferior constrictors of the larynx and this is especially true during regurgitation or actual vomiting and likewise is the upper end of the esophagus well within the domain of vision and two-handed palpation. Thus ulcers, polypi, pedunculated tumors, extension of indurations, webs, tags, and the lodgment of foreign bodies are brought not only into view but can be palpated as described before. From these areas scrapings from ulcers and specimens from tumors can be taken with care and selection for further pathologic research. Under suspension the entire hypopharynx, larynx and upper end of the esophagus are not only under direct view, but open to the two-handed deliberate palpation. In the case of babies and young children the crane is not essential to perfect view and once the view is obtained, it is extremely difficult for the little patient to wriggle loose so as to interfere with the work at hand.

As a means of operative approach to the larynx and upper esophagus suspension laryngoscopy has made possible the development of the two-handed surgery of these regions. Generally speaking, it is now hardly fair to compare any one-handed operative procedure with the modern two-handed type; and, while I would not have you think for a minute that I would belittle that artistic, delicate and difficult procedure for removal of a small tumor from the cord by mirror and forceps, or by spatula and forceps, these procedures are pulling and tearing in their very nature, and their accuracy is always in question. In the hands of a selected few the accomplishments are wonderful, but time, patience, perseverance, ingenuity, and the temperamental make up of both patient and surgeon, are essential to success by these methods; while, once the patient is suspended, the two-handed surgery is simply putting into practice those fundamental principles which every physician learns from his dissection room days to the time he finishes his surgical assistantship at the operating table.

To detail for you the accomplishments of this two-handed surgery would, I fear, be simply a repetition of my previous publications upon this subject, and yet I cannot help but illustrate its various phases and will ask you to see a little patient with me. The removal of vocal nodules in babies and young children is extremely simple. Grasp the tiny mass accurately and here you are permitted to take hold any number of times without the fear of losing the view and the small knife finishes the dissection. This is applicable to all of the benign pedunculated tumors to which the larynx is liable and the age may range from one to seventy years.

As I have said before, I have deliberately dissected malignant neoplasms from within the larynx seven times and without recurrence; the last case is about eight months ago and from that to four years.

All foreign bodies lodging within view are easily removed, better with two hands free than with one; and, the greater the impaction, the more the necessity for this procedure. Dental plates, open pins, and sharp metallic or shell pieces, are especially considered. The resulting traumatism and injury are almost nil as compared to either the use of the indirect method or direct spatula. The cautery can likewise be applied from the pin point or linear streaks to the mass destruction of Percy. In special conditions stitches can be taken as I have previously noted and plastic flaps constructed and sutured as desired.

Direct intubation is also practiced and the spatula is becoming almost essential in the passage of bronchoscopes in infants and young children; this has been discussed before. I find the suspension now of added advantage in what might be termed combined operations such as thyrotomy and suspension, or laryngectomy and suspension, with an assistant to keep the mouth clean of all secretions and to view the larynx through the mouth during thyrotomy is I assure you of decided advantage. Likewise we find it invaluable during the total extirpation of the larynx, especially to determine the upper limit of dissection and the final coaptation of suture for the esophagus after the total removal. Approximation of parts along the line of clearage and proper suture of the wound can be accurately guarded and is of invaluable help in this step of the operation.

Finally, there is but one "if" to all of this, and that is: If in any case it is impossible to convert the line from the upper teeth to the base of the epiglottis into a straight line, then suspension is impossible and this surgery is not applicable. As your experience increases, this possibility decreases as with all technic.

XLIX.

THE LINGUAL DUCT IN THE PRODUCTION OF PAROXYSMAL COUGH.*

By Thomas W. Lewis, M. D.,

Chicago, Ill.

The lingual duct or canal of Bochdalek is a defect of fetal development extending downward from the foramen caecum, the slight pitlike depression seen at the apex of the V formed by the rows of circumvallate papillae at the base of the tongue. This duct or canal has been recognized only to be neglected. Systematic works on anatomy dismiss it with a word, if they so much as mention it. The only monograph on the tongue which I have been able to discover devotes to it a short paragraph and attributes to it no etiologic importance in conditions affecting the tongue. Congenital cysts of the duct have been reported as well at the base of the tongue as lower in its course, but so far as I have been able to discover no other condition has been reported having its origin in the lingual duct.

In order to comprehend properly the relations of the lingual duct it is necessary to recall the development of the tongue and thyroid gland. The tongue is formed by the coalescence of three separate buds: the anterior bud, the tubercular impar, forms the dorsum of the tongue, the posterior buds form the posterior portion or base. The foramen caecum at or just posterior to the V formed by the circumvallate papillae represents the point where the three surfaces meet. From this point, early in fetal life, begins an invagination downward and forward for the formation of the thyroid gland. This bud becomes hollowed, later branches, dilates and becomes lobulated to form the developed thyroid gland. Very soon after the dilatation of the lower extremity begins, the upper part of the tube becomes closed and all trace of a canal has disappeared, the thyroid being completely detached from the pharynx except by a fibrous cord.

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*Read before the Chicago Otolaryngological Society, November 3, 1919.

That this tube may remain patent in some part of its course even until adult life is a matter of frequent observation. It may run upward as a patent canal from the isthmus of the thyroid, pointing in the midline of the neck, or on the side, or the extremity may be closed giving rise to the formation of a cyst. It may have a patent lumen without connection either with the thyroid or the surface and there may be the frequently observed duct running down from the foramen caecum. This latter condition is that with which we have to do in this paper: A duct beginning at the foramen caecum and running downward into the base of the tongue for a varying distance. Butlin, curator of the museum of pathology of the Royal College of Surgeons, reports a number of cases ranging from one to three cm. and cites a specimen in the museum which purports to extend from the foramen caecum to the isthmus of the thyroid, this specimen, however, he does not credit, believing it to be an artifact.

The cases referred to here are of interest because they had uniform symptoms evidently attributable to irritation of the lingual duct and because treatment based on this assumption invariably and promptly gave relief to very distressing conditions.

The first case which came under observation had a history of considerable interest and is referred to at some length.

Case 1. Mrs. Y., healthy, normal, with no history of interest beyond this. In the spring of 1892 she developed a cough of paroxysmal type which was very severe and very persistent, lasting several weeks. The cough was dry. No cause was found for it either in the chest or upper air passages and no relief was obtained except from doses of codein and at times morphin. At intervals, varying from a few weeks to several years, she had similar attacks lasting sometimes as long as five or six weeks. During these attacks the paroxysms of coughing were so frequent that at times it was necessary to resort ot morphini n order that the patient might have sufficient sleep. In the course of one of these attacks, during a paroyxsm of coughing, a rib was torn from its cartilage and the chest had to be strapped. During all of these attacks the patient was under the care of very able attendants and at no time was any cause found for the attacks, the invariable conclusion being that the cough was simply nervous. In the spring of 1909, the patient, being otherwise perfectly normal, was suddenly conscious of an extremely foul and nauseating taste in the mouth. She was at church at the time and was compelled to leave because of the nausea and foul taste. During the day there was repetition of the nausea and foul taste, some soreness at the base of the tongue and she began to cough. That afternoon she consulted me and after a most rigid and prolonged examination I had despaired of finding the source of any discharge in the mouth or throat, when in the act of withdrawing the mirror for the last time I noticed a mere pinpoint of white near the base of the tongue. This was wiped away and immediately reappeared and was found to emerge from the foramen caecum. A probe easily passed into the lingual duct for the distance of a full half inch. This was repeatedly done and demonstrated to the husband, himself a physician. The passage of the probe invariably induced a terrific paroxysm of coughing lasting for several minutes. By pressing downward and backward with the probe the mouth of the canal could be stretched so that the inflamed mucous membrane lining could be seen. The duct was carefully wiped out with pure carbolic acid. The patient reported marked diminution of the cough the next day and the treatment was repeated. On the day following the cough had entirely disappeared. Twice afterward the patient was seen, at intervals of six months or more, with some soreness at the base of the tongue and a recrudescence of the cough. Repetition of the treatment was invariably and promptly effective. On another occasion a seeming failure of treatment directed at the lingual duct was subsequently explained by the development of a frank pertussis which spread to the whole family.

Case 2. George Y., 17, eldest son of case 1, well developed, healthy schoolboy. While at school near Washington in the spring of 1909 developed a cough. He would begin to cough regularly about five o'clock in the morning and kept it up so persistently and intensely that he became a source of annoyance to the entire household. He was examined by several reputable men in Washington, but no cause was found for the cough and as this still persisted he was taken out of school and kept out of doors. His condition remained in statu quo until August when he came to see me. Examination revealed a patent lingual duct of a depth of one inch. Intense coughing was induced by the passage of the probe. The duct was wiped out with carbolic acid and when he came back the next day he reported that he had slept through till nine o'clock, a luxury he had not been able to enjoy for many months. The cough was gone and has not returned.

Case 3. Katherine O'B., 35, widow, washerwoman, weight about 180. "A good fighting man" with no history of interest beyond this. For four or five months past has had a most distressing paroxysmal cough. There has been no sputum but a sense of something in her throat. The chest was negative. The throat was negative except that the foramen caecum was well marked and its margin everted and edematous. A probe passed into the duct for three-quarters of an inch. The contact of the probe produced a paroxysm of coughing which lasted for several minutes during which the eyes protruded and the conjunctivae were markedly congested. This patient, seen in the Central Free Dispensary, was examined by Dr. John Edwin Rhodes and the late Gurney E. Stubbs, both of whom concurred with the conclusion that the irritation of the duct was the cause of the cough. Unfortunately this patient did not return to the dispensary and subsequent history is lacking.

These three cases are all that I have seen with symptoms attributable to infection of the lingual duct. In addition to these I have in a routine search during the last ten years encountered six other cases into whose lingual ducts a probe might be passed for as much as half an inch, but they showed no evidence of disturbance.

Dr. August Strauch, an office associate, had in the spring of 1913, a case presenting identical conditions. A man of eighteen years had been troubled during several months with paroxysmal coughing coming on at eleven o'clock at night some time after retiring. No cause could be found for the cough and no relief was obtained. I suggested the investigation of the lingual duct and on examination a duct of some depth was found containing a plug of inspissated mucus of the size of a hemp seed. Dr. Strauch was able to slit this duct with the electrocautery to the entire and permanent relief of his patient. This case showed, as did case 2, a regular periodicity of the paroxysms, but we are unable to establish any rational explanation of this apparent periodicity. This case was reported by Strauch in Muench. Med. Woch. July, 1913.

In casting about for an explanation of the relation between a focus of irritation in the lingual duct and an explosive paroxysmal cough, the glosso-pharyngeal-pneumogastric reflex seemed scarcely satisfactory. There is a more direct reflex and one that seems to present a clear explanation of this disturbance. Some filaments of the superior laryngeal nerve are distributed at the base of the tongue and are held responsible for cough in infection of the lingual tonsil. These filaments are doubtless the nerves involved in irritation of the lingual duct and give us a direct connection with the pneumogastric and the cough centre.

The conclusion seems justified that the lingual duct, hitherto neglected, may be the nidus of an infection producing a proxysm of coughing not yielding to ordinary methods of treatment. That the duct is fairly frequently patent is evident and opportunity for infection is common.

4557 Broadway.

L.

DERMOIDS OF THE ANTERIOR MEDIASTINUM. WITH REPORT OF A CASE.*

By Robert Sonnenschein, M. D.,

Chicago.

Dermoid cysts have been found in various parts of the body, from the head to the pelvis, occurring most often in the ovaries. They are characterized by having a wall of connective tissue with an inner lining of epidermislike structure; and secondly, by often containing hair. We are in this report concerned only with dermoids found in the anterior mediastinum, notably its upper portion. As will be shown later, the growth is quite rare in this locality.

The case to be reported is that of Mrs. G. I., aged thirty, housewife, American, who, seven or eight years ago, received treatment for goiter. Since that time there had been increasing difficulty in breathing, especially on exertion, or when exposed to a strong wind. At the time she presented herself the condition was most distressing, particularly at night, preventing sleep to a very considerable extent. At times a distinct wheezing was observed by the patient. The attacks of dyspnea were more frequent and more severe just before and after menstruation. Family history was negative.

Examination at this time, April, 1915, showed in the nose a septal deflection towards the left side; the pharynx and larynx appeared negative. Unfortunately, no endoscopic examination was made to note the condition of the lower trachea.

The neck showed a moderately sized, soft enlargement of the thyroid gland. Behind the sternal notch the upper end of a rounded mass could be palpated. On percussion there was dullness over the upper portion of the sternum.

The case was referred to an internist and a radiologist. The physical findings and the X-ray shadow led to the diagnosis of the presence of a thymus, with a consequent thymic asthma. Operation was suggested by a surgeon who had also seen the case, but the patient at that time declined all interference, and I temporarily lost sight of her.

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*Read before the Chicago Otolaryngological Society, November 3, 1919.

A year and a half later we learned that she had come into the good hands of Dr. Darwin B. Pond, who operated a few months after I had last seen her. I am deeply indebted to him for his kindness and courtesy in furnishing me information regarding the operation, the status one year thereafter, and last but not least, presenting me with the growth which he removed and which I take pleasure in showing you this evening.

The patient stated in a letter written one year after the operation that all her dyspnea had disappeared, and that she was perfectly well in every way. This freedom from all distress is still present, as confirmed by conversation with her husband a few months ago. It is now four and a half years since I first observed the case and it is three years since the operation was performed.

The technic of removal of the growth, as described by Dr. Pond, is that the usual eliptical incision as employed in goiter operations was made just above the clavicle. The tumor was situated slightly to the left of the median line, its upper end projecting above the sternal notch, its lower portion lying behind the sternum. Catgut sutures were used to obliterate the cavity, no drainage inserted, and the skin closed with horse hair. The patient made an uneventful recovery.

We here have the growth, which is about the size of an English walnut; it is cut open, showing a rather thick, firm wall. The contents are a mass of hairs and some sebaceouslike material. Owing to long exposure to preserving fluid, the latter has largely been washed out of the cyst.

Histologic sections were made of the wall of the tumor, which Dr. A. W. Stillians kindly examined and reported as follows: "There is a subcutaneous layer with fat, and above this connective tissue containing blood vessels but no glands: considerable round cell infiltration of the connective tissue. Above this is some abnormal squamous epithelium. There is no granular layer, but there is present an abnormal horny layer. In the sections examined no hair follicles were seen." We thus have here a socalled dermoid cyst.

Now with reference to the occurrence of these cysts in the anterior mediastinum, Hare reported, in 1889, in a collection of 520 cases of mediastinal disease exclusive of diseases of the heart and lung, 288 cases of tumor, and of these only 10 were dermoid cysts. Hoffman, in 1896, collected 12 cases of dermoids of the anterior mediastinum. Planz, in 1896, reported 25 cases. Ekehorn, 1898, reported 29 cases and added two of his own. Christian, in 1902, collected 39 cases and reported one of his own, making a total of 40. This author has the most complete article on the subject which we have been able to find. With reference to sex, one can say that the cases are about evenly divided between male and female. The question of age has an important bearing in that most of the cases occur in young adults, between twenty and thirty years. That is to say, these figures refer to the time of death or operation, as the growth, of course, had been present since childhood, but the symptoms which called attention to the growth occurred at the ages mentioned.

As regards the etiology, Ribbert showed years ago that pieces of epidermis transplanted into the abdominal cavity often produce cysts lined with epidermis, and that bits of epidermis transplanted into subcutaneous tissue will proliferate in the split of the tissue in which they lie. Many dermoids lie in that portion of the anterior mediastinum between the upper border of the heart and the root of the neck. Just as the heart develops in the cervical region of the fetus, and later descends into the thorax, and the same is true of the thymus, so there may be a passage downward of the "anlage" of the dermoid cyst. Furthermore, the presence of the branchial clefts and the development of the thymus and thyroid from the third and fourth cleft (even though regarded as of entodermal origin), the intimate relation between the ecto- and entodermal layers, as shown by Minot, all these factors favor the misplacement of portions of the germinal layers.

Symptoms are sometimes entirely absent clinically, and the tumor is found accidentally at postmortem where the death is due to other incidental causes. When present the symptoms are most frequently referable to the respiratory tract, namely, dyspnea with pressure on trachea or bronchus; coughs, with at times free expectoration, often with foul odor; and hemoptysis in a number of cases. The most peculiar and interesting phenomena is the coughing up of hairs reported in a number of instances, occurring at various times during the course of the disease. Rarely is there difficulty in swallowing or any pain in the chest.

Physical signs are sometimes but slight; occasionally the chest on the side of the tumor was found distinctly bulging; in a few cases the tumor appeared in the neck through the superior aperture of the thorax, and in a small number fistulæ formed between the cyst and the skin. Dullness on percussion is noted in a considerable proportion of the cases, and auscultation in the region of the cyst showed diminished or suppressed respiratory sounds.

The duration of the condition is difficult to deetrmine, but judging from the time of onset of symptoms the period varied from one to fifteen years. The course is thus a very slow one compared with malignant disease in the same part of the body. The position of the tumor varies in that it may be either in the lower half of the thorax, between the heart and adjacent lung, near the hilum of the lung, in the lung substance itself, in the neck at the suprasternal notch, but it is most frequently found in the upper half of the anterior mediastinum, wholly or in part, immediately behind the upper portion of the sternum. In this latter locality the cyst may develop either upward toward the neck, latterly into the pleural cavity, or downward between the heart and lung, for it is prevented from going forwards by the sternum, or from spreading posteriorly by the great vessels, trachea and vertebræ. The tumor is often adherent to some of the neighboring structures, notably the lungs or pericardium, less frequently the diaphragm, chest wall or large vessels. This often renders any attempt at removal difficult or impossible. It is a fortunate fact that the cysts do not, except in rare instances, produce injury to or destruction of adjacent organs. The size of the dermoids may vary from that of a pigeon's egg to that of a child's head.

From the pathologic standpoint, dermoid cysts may be divided into three classes: First, essential dermoid cysts of ectodermal origin. These are the ones most frequently reported, and they are unilocular, either simple or with diverticula, or occur as multilocular cysts. The walls are lined by epidermis containing as a rule hair follicles and sebaceous glands; occasionally sweat glands are present. At times the cyst wall was found to consist merely of connective tissue; in some cases bony plates, pieces of cartilage or teeth are seen in the cavity of the growth or in its wall. The second class of dermoids includes those of great complexity, derived from all three germinal layers, with the formation of rudimentary organs, and these may be regarded as teratomata. These cysts are very rare, judging by the few cases reported. The third class is that of tumors of the first two groups which are malignant in some part of their structure and form metastases in other organs. The contents of the cysts in most of the cases were a thick, greasy, semisolid material mixed with hair.

The diagnosis can, of course, only be made when portions of the contents of the dermoid are obtainable for examination, as, for example, if a fistula between the cyst and skin exists. Pathognomonic is the coughing up of hair in the case of a deeply situated thoracic tumor. A probable diagnosis can sometimes be made where there are signs in a young adult of a solid, nonpulsating mediastinal tumor, which grows slowly and shows no metastasis.

Treatment: While operative interference offers the only solution, a radical operation is often exceedingly difficult, while simple drainage usually proves ineffectual. I do not know whether X-rays or radium have been used, but doubt whether they would help.

CONCLUSIONS.

1. The origin of dermoids is a misplacement of ectodermal tissue during fetal life.
2. Dermoid cysts of the anterior mediastinum are quite rare, usually manifest themselves in early adult life, and are of rather long duration.
3. The location is usually behind the upper part of the sternum.
4. The coughing up of hair is practically pathognomonic.
5. Surgical interference is the indicated treatment.

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29 East Madison St.

LI.

THE FALLING REACTION IN ACROBATIC AVIATORS.

By Robert J. Hunter, M. D.,

FORMERLY MAJOR, M. C. FLIGHT SURGEON,
ELLINGTON FIELD, TEXAS,

Philadelphia.

Thinking that it would be of interest to see if aviators show any change in the falling reaction after experience in the air, I have studied a few cases with that in view. The men were stimulated in the vertical canals only, as they are the ones involved in loops and tail-spins and would show the most marked change, if any.

The technic was the standard used in the Air Service; head on the clenched hands, which in turn rested on the knees. The angle quoted in the figures were made by projecting it from the center of the seat, at the back of the turning chair, to a board fastened to the head rest. As the head rest was moved up and down to adjust it for different heights the angles were not absolutely correct.

For the benefit of those not interested in otology, I might explain that stimulation of the semicircular canals by rotation causes nystagmus and a sensation of turning, after the chair is stopped. A normal man can point to an object with his eyes shut, after he has felt it, but after rotation, instead of pointing to the object, he makes an error in the direction, opposite to that in which he feels he is turning. The reactions are constant and specific for the various canals, which may be, by proper methods, individually examined. For the horizontal canals, the shoulder group of muscles is used, and the error called past pointing; for the vertical canals the back muscles are used and the error is falling to one side.

Twenty-seven men were turned; eleven were instructors in acrobatics, varying from 35 to over 600 hours of acrobatic flying. Their total flying varied from 170 to 1,800 hours, giving an average of 514 hours. Their average degree of falling was 2.9°. The least response was shown by the man who had the second longest experience and the greatest deviation was shown by a good pilot, who examined to be excused, because he had just had a tooth pulled and felt, as he expressed it, "all in."

Another group of five aviators, selected at random, was examined. Their experience in acrobatics varied from 10 to 20 hours; their hours of flying from 85 to 175, giving an average of 121 hours. Their average degree of falling was 6.7°. Eleven ground men were then examined. For most of them it was their first experience in the rotating chair. They had had very little experience in the air. One man had never been up. The most experienced had had 15 rides in the last sixteen months. The average degree of falling was 20.6°.

The difference between the experts and the untrained men was very marked and showed, without doubt, that men used to air work give less response to the falling test than ordinary men.

Rapid rotation of the body causes vertigo. We may define vertigo as a false sensing of motion. Past pointing is a physical sign of vertigo, in that the subject compensates in pointing, for the rate of movement that he feels. Thus we might conclude that the degree of past pointing may be taken as an indication of the amount of vertigo. I think that this is relatively true when the subject has not had any acrobatic experience, but where evolutions are performed frequently the subject learns to overcome the effects of vertigo and keep their equilibrium, even though they feel that they are falling or turning. We should consider the question, whether the sense organs in acrobats become accustomed, through training, to the rapid turning and no longer produce vertigo. Whirling dancers studied by Lieutenant-Colonel Eugene R. Lewis, M. C., in the investigation preparatory to his paper, all maintained, with one exception, that in spite of the fact that they had engaged in these exhibitions for many years, they always had vertigo. The one exception bumped into one of the kings, at the conclusion of his stunt, shortly after stating that he never became dizzy. These performers when examined in the turning chair had nystagmus of normal duration. The duration of after turning nystagmus in army aviators, as reported by Fisher and Babcock (J. Am. M. Ass., March 15, 1919, and Levy, J. Am. M. Ass., March 8, 1919) is normal. Levy also notes less violent falling reaction in aviators. K. Dunlap (Air Serv. Med., U. S. A., pp. 316-318, 1919) finds that nystagmus is less after repeated turning. His work is refuted in Fisher's article. Observations by myself during the examination of several hundred expert aviators would show that nystagmus is of normal duration. Examinations of tight rope walkers by me gave normal turning reaction and nystagmus. I found a man with subnormal responses, who had formerly been a trick cyclist and who maintained that that was sufficient evidence of a normal balance sense. He had a plus four Wassermann I could not determine from the history whether infection had occurred while he was still engaged in cycling or afterward.

I did not examine the nystagmus in the group of men quoted in the experiment, but many of these men had been examined at various times and the duration found normal. I took the man who showed the least falling reaction and noted his response to the slightest degree of rotation, accelerating speed, maintained speed, slowing speed and sudden stop, and found his responses entirely normal, to the great amusement of his fellow instructors, when they heard the "bell wether" of the stage with eleven months of exclusively acrobatic flying saying "stopped, stopped, stopped" while he was really whirling at full speed. It would have been of interest to measure the duration of vetrigo after turning in the entire group and the degree of past pointing after stimulation of the horizontal canals, but numerous duties in the field prevented me from doing so.

As past pointing is entirely a voluntary act, it appears that through training, these men have learned to ignore the excessive stimuli and sit up straight in spite of the fact that they feel that they are turning. It may be that their tactile, muscular, articular tendinous and deep sensation tracts have become highly trained and they get instant information from the seat of the chair, helping orientation. It is a common observation, in examining men for their sense of motion, that any auditory or visual stimuli will immediately help them to orient themselves and correct the false impression given by excessive stimulation of the labyrinth. The question arises, How are we to determine that a man is normal if he fails to fall? We should rotate him ten times in twenty seconds and measure the duration of vertigo, which should be 16 to 36 seconds, having him keep the head 30° forward, eyes closed, and then rotate him with the head on the knees, five times in ten seconds, and note the presence of vertigo. We can also tell that these men are getting stimuli through, by watching them when they sit up or when they past point, and we will see a swaying to one side or a past pointing on raising the arm which is overcome on the way down.

Conclusion.—Slight falling to one side, or even the ability to sit up erect with closed eyes, after stimulation of the vertical canals by rotating the chair five times in ten seconds, or even five times in five seconds, is present in acrobatic aviators. Other individuals fall markedly to the side of rotation.

By close observation, a skilled observer can see that muscular effort is being used to overcome the tendency to fall. By timing the after-turning vertigo, we can determine that the tracts are normal.

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LII.

A NEW OR HITHERTO UNDESCRIBED FORM OF MAXILLARY SINUSITIS.*

By Ross Hall Skillern, M. D.,

Philadelphia.

Miss P., age 50, presented herself in September last with the following history:

During the early months of 1919, she contracted a severe cold in the head with swelling of the upper lip and the formation of socalled fever blisters, which were especially annoying in their persistence. Instead of the usual course, the cold continued in a more or less chronic form with occasional acute exacerbations. During March a postnasal discharge containing blood but no pus made its appearance. Later the blood became darker and more profuse, while the discharge assumed a thicker and heavier consistency but no more copious. This continued gradually changing its character until by July the expectorated blood assumed the appearance of clots resembling small pieces of liver, which occasionally were mixed with thick yellow pus. Cacosmia was never in evidence, neither was there an appreciable odor to the secretion. The discharge was always obtained via the postnasal passages; none had been expelled through the anterior nares. Headache, neuralgia or local tenderness had never been in evidence nor were other symptoms of sinus involvement particularly marked. The chief complaint of the patient was the expectoration of these liverlike clots of blood with the utmost frequency, which even made it necessary to cause their expulsion several times during the night, thereby greatly interfering with the necessary rest. On this account she had also practically abstained from social intercourse or even places of amusement, as the constant expectoration into a handkerchief had become exceedingly mortifying. It was chiefly on this account and the haunting fear of a hidden malignancy that prompted her to seek relief.

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*Read at annual meeting of American Laryngological Association, May 28, 1920.

On presentation in September, no evidence of an active inflammation were present, either externally or by rhinoscopic examination. The nose appeared to be fairly normal. no traces of blood or purulent secretion in the region of the middle turbinate, or indeed elsewhere, being discernible. The nasopharyngoscope disclosed but little change in the normal mucosa and nothing to suggest the presence of a sinus involvement. The teeth were entirely negative.

As a routine measure in such cases, the Lichtwitz needle was introduced into the right maxillary sinus with a negative result, the injected saline solution returning unchanged. On needle puncture of the left antrum, however, as soon as the air was forced into the sinus there escaped an ounce or more of apparently pure unclotted blood, the quantity of which was considerably increased on lavage with the normal salt solution. No sign of pus, either granular or en masse, was present. The lining mucosa of the sinus did not appear to be greatly thickened, as the lumen of the cavity was found without difficulty by the point of the needle, and the sound made by the injected air proved without question that the point was not embedded in thickened mucosa. Irrigation was continued until the flow returned clear, after which 50 per cent alcohol with 1/2,000 bichlorid, sufficient to fill the sinus, was injected and the needle withdrawn. Bacteriologic examination of the blood showed an abundance of streptococcus hemolyticus.

The injections were continued daily, the discharge gradually losing its hemorrhagic appearance, only to assume more and more a purulent content, the total amount of secretion remaining about constant. It was therefore apparent that the irrigations were exerting little influence on the course of the disease; the character of the secretion, however, was changing from sanguinous to purulent. At the end of fifteen days, after about the same number of treatments, the blood had to all intents and purposes disappeared, leaving a thin, purulent, granular secretion, which mixed readily with the irrigating fluid and formed with it a milky appearance. The alcohol injections were continued, gradually being increased in strength until the pure 95 per cent was reached, with no apparent influence upon the infection. About this time a swelling appeared upon the septum, which rapidly developed into an abscess. This was incised and in a few days subsided, but was followed by a bloody discharge from the right side of the nose. The secretion hitherto had been entirely unilateral and confined to the left side. Needle puncture of the right antrum brought forth a large quantity of bloody fluid identical with that which had originally appeared from the opposite sinus. Previous to this, the right side had not been affected. The treatments now consisted of needle puncture and irrigation of both antra with a 3 per cent solution of hyperchlorite of soda, well diluted. The character of the secretion gradually changed to a granular milky one, diminishing greatly in amount, so that the patient experienced fairly comfortable nights and was not so annoyed by the frequent use of the handkerchief as was formerly the case. Despite this improvement and the tri-weekly irrigations, the course of the disease now appeared to become stationary so far as the character and amount of the discharge were concerned. Various strengths of alcohol and bichlorid, iodin and nitrate of silver were applied, one on one side, the other on the opposite, in order ot test the comparative efficiency of each, and while at times it appeared as though a certain remedy was proving of value only to result in disappointment. The present condition of the patient is unsatisfactory in that she is fairly comfortable under biweekly treatments, but if untreated the disease shows a great tendency to revert to the hemorrhagic form.

This case is unique in my experience. The peculiar bloody discharge, unaccompanied by any subjective sign of inflammation with its tendency to diminish, but become purulent after irrigations and on noninterference to revert to its original type, is puzzling to say the least.

The advisability of a radical operation has been thoroughly discussed and finally decided upon where it is hoped by pathologic investigations the exact status of the infection will be determined.

LIII.

THROMBOSIS OF THE LATERAL SINUS WITHOUT SEPSIS.*

By Harry L. Baum, M. D.,

Denver.

Many otologists concur in the opinion that every case of thrombosis of the lateral sinus should be subjected to the usual surgical procedure of exenteration, with or without ligation or excision of the jugular, as the symptoms and judgment of the operator may indicate. Such is undoubtedly the safe and common sense method of dealing with these cases in most of their manifestations, but it is my belief, based upon the literature and certain experience of my own, that there is a class of cases of thrombosis which can be rightly managed in a more conservative manner.

E. W. Day, in a paper read before the American Otological Society in 1915,[1] reports six cases of spontaneous cure of unrecognized thrombosis, the condition not being suspected until found accidentally during operation. One of Day's cases had a history of previous suppurations, in two the suppuration was of at least two months' duration and three were chronic. Of the six, four showed complete organization of the clot and two were partially organized. In none was there a history of symptoms referable to the sinus. He also mentions three other cases from his series, in which the distal ends of the clot had organized, a sinus abscess had formed and had broken through the necrotic sinus wall to drain into the mastoid cavity. In none of these were there sinus symptoms.

H. Friedenwald, in a paper read before the American Laryngological, Rhinological and Otological Society in 1913,[2] gives numerous references to similar cases from our own and foreign literature, in which nature had made a successful attempt to organize the clot or wall off the infection. Most of these cases were discovered accidentally at operation and had shown no indications of sepsis referable to the sinus.

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*Read at the meeting of the Western Section of the American Laryngological, Rhinological and Otological Societ, Denver, Colo., March 1, 1919.

It seems reasonable to conclude, therefore, that sinus thrombosis per se is not necessarily an indication for radical interference, but that in cases discovered at operation, even during the active stage of the inflammation, if there have been no pyemic symptoms to lead to a suspicion of involvemenet of the sinus, simple drainage with thorough cleaning out of the mastoid cavity is all that is indicated. And that exenteration of the sinus with the establishing of a free flow from both ends and possibly the ligation or excision of the jugular is unnecessary, except in the presence of definite signs of sepsis.

In support of this theory I wish to present four cases managed along these lines and with successful termination in all.

Case 1.—A. W., age 36, was referred to me by Dr. Hess on March 27, 1914, with the history of having had an acute otitis two months previously, following a cold. Suppuration had continued without improvement since that time, and he had suffered much pain in the mastoid region and radiating over that side of the head. There was no history of septic attacks.

Examination: There was an acute suppuration of the right ear with much sagging of the posterior superior canal wall, so that the membrane was not visible. The mastoid was somewhat swollen and there was marked tenderness. There was no fever. Operation was advised and accepted.

Operation: A mastoid of pneumatic type was found, with extensive destruction, practically every cell being involved, and bleeding from the bone was profuse, suggesting thrombosis. The sinus was found to be uncovered for a distance of half an inch just below the knee. Removal of granulations revealed a necrotic opening into the sinus with thrombus formation. This thrombus was dislodged during inspection, and a free flow followed from the sinus. A small pad of iodoform gauze was placed over the opening, with only sufficient pressure to stop the bleeding, and the operation was completed with thorough removal of all necrotic bone, leaving a large posterior opening for drainage. Cultures from the mastoid showed streptococcus hemolyticus in pure culture.

The postoperative course was uneventful. Temperature never exceeded 100, and healing was very satisfactory, with a dry ear and good hearing.

Case 2.—O. T., age 17, came to me on June 2, 1915, with a history of having had pain in the left ear about three months before, followed by discharge. This suppuration had continued since, with some pain in mastoid region. About one month before he began having attacks of dizziness, made worse on quick movement of the head, and sensation of falling. Had no nausea or vomiting and had never actually fallen. These sensations had stopped two days before with an increase in the amount of discharge. He had no history of septic attacks.

Examination: Acute otitis, left side. A good sized perforation was present, with granulations showing through and free discharge. Sagging of posterior and superior portion of membrane, but no sagging of posterior canal wall. Moderate amount of mastoid swelling with marked tenderness. Hears all forks well with that ear, especially by bone, though hearing somewhat subnormal. Rotation test normal, both sides. Caloric not taken. Temperature normal. Fistula test: Strongly positive, but peculiar in that the response consists of one movement only to each pressure, a definite swinging of both eyes to the right with quick return, but no repetition of the movement until further stimulation is applied. Slight vertigo, but no nausea, lasting only during the nystagmus. No spontaneous past pointing and points normally after rotation. Immediate operation advised.

Operation: A simple mastoid was done, finding extreme destruction of mastoid bone, including inner table overlying sinus, which was exposed from the knee downward for some distance, with formation of a sinus abscess within its walls at this point. The abscess was drained through the necrotic wall of the sinus, but the firm thrombi above and below were left undisturbed. The dura of the middle fossa was also exposed, but intact. No evidence of labyrinthine fistula was discovered. A wide opening for drainage was left posteriorly, with light packing. Cultures showed pure growth of streptococcus hemolyticus.

Postoperative course: The temperature never exceeded 100 and there was no nystagmus or vertigo. The ear was dry at the first dressing and the perforation healed promptly. The fistula test was negative at the first dressing and remained so. Eventual healing was perfect and hearing excellent.

In this case it was my conclusion that the positive fistula test was due to pressure exerted on the cerebellum, especially in view of the unusual character of the nystagmus, and that the attacks of vertigo were caused by pressure of the sinus abscess on the cerebellum up to the time that it ruptured into the mastoid. This probably occurred two days before the operation, when the attacks ceased and the discharge from the ear increased. There was apparently no involvement of the labyrinthine capsule, although Ruttin describes this type of reaction as coming from the labyrinth in two of his cases.[3]

Case 3.—M. A., age 12, was referred by Dr. Palmer on July 2, 1918, with the following history: The left ear had been discharging for several years, and about one month before coming to me she had been quite sick, having severe vertigo and vomiting with inability to stand. A history of nystagmus was unobtainable, as she was not observed by a physician at that time. She remained in bed for a week, with gradual subsidence of these symptoms. Then, about one week before I saw her, she developed pain in the left ear with increased discharge, fever and headache. The headache was general. There was no history of chills or sweats.

Examination.—Left ear: The posterior canal wall was swollen so as to occlude the canal completely from the meatus inward. A discharge of foul pus, brownish in color, was coming from a perforation in the canal near the meatus, and a probe passed through this opening entered the middle ear along the canal wall, which was intact. There was no evidence of a tympanic membrane, although, on account of the complete closure of the canal, it was impossible to inspect the middle ear visually. The mastoid was quite tender, but there was no swelling. The fistula test was negative, there was absolute deafness and the caloric test was ineffectual on account of the swelling of the canal. There was no spontaneous past pointing, no nystagmus and no vertigo. Temperature was 102. The pus showed a very mixed infection, as was to be expected. X-ray showed entire loss of mastoid structure on that side, with normally developed pneumatic mastoid on the other.

Operation: Upon removing the external table a gush of pus occurred, liberating perhaps two drams of foul brownish pus under pressure. Enlargement of the wound of entrance revealed the fact that the cerebellar dura and lateral sinus lay immediately beneath the cortex, there being no mastoid cavity whatever. The abscess was seen to be epidural, and there was no evidence of communication with the middle ear. No effort was made to locate the antrum or aditus at this time, as her condition did not justify prolongation of the operation. The sinus was found to be thrombotic and a few drops of pus could be expressed from a small opening in its wall. This opening was enlarged carefully, but there was no evidence of communication with the cerebellum, and it was not disturbed further. The exposed dura was thickened and covered with old granulations, but intact. Inspection of the external canal showed no opening through the bony wall, the skin having been pushed up from the bone by pus coming out from the middle ear.

Her improvement following this preliminary operation was very satisfactory, and in one week it was considered safe to subject her to the final procedure, her temperature having been normal and headache gone since the first operation. Accordingly, the posterior canal wall was taken down, as in a radical mastoid, and the middle ear and aditus were exposed. There was no antrum, but a cholesteatome was found occupying the middle ear, aditus and extending upward to the dura of the middle fossa and backward to the dura of the anterior surface of the cerebellum and involving the external semicircular canal. The labyrinth operation was done and the middle ear cleaned out as in the radical, with the usual radical plastic on the canal. The posterior wound, however, was not closed completely, but was left partly open for safe drainage.

The subsequent course was uneventful. The wound healed as any radical, the posterior wound closing very promptly with little further drainage. The foul discharge persisted for some time from the middle ear, but epithelialization was complete in about six weeks and the ear was dry. There was no postoperative vertigo or nystagmus, and temperature was normal or practically so.

My conclusion in this case was that the absence of mastoid structure was due to the destruction of the mastoid at the time of the beginning of the suppurative process some years before and that the epidural abscess had been walled off in that location since that time. The labyrinth had undergone invasion comparatively recently, as indicated by the history, and was not responsible for the abscess and thrombosis, the latter being the result of direct infection through the sinus wall from the overlying abscess. The sinus had at no time given rise to septic symptoms, so far as could be ascertained from the history.

Case 4.—This case, not my own patient, I saw in consultation with Dr. Eichberg on August 30, 1915, and am indebted to him for permission to report the case. I was also present at the operation and followed the postoperative course.

Examination: H. W., age about 35, had suffered an acute otitis about five weeks before, and suppuration had persisted without diminution. There was considerable sagging of the posterior superior canal wall, so that the drum could not be seen, and the mastoid was swollen, with edema. Tenderness was marked. Temperature was 101. Discharge was not so free as it had been.

Operation: A necrotic external table was found, opening into a pneumatic mastoid almost completely destroyed. The lateral sinus was exposed for a considerable distance below the knee, as a result of extensive necrosis of the inner table, and was accidentally opened in cleaning away the necrotic bone from around it. Inspection revealed that it was completely filled with a firm thrombus, which had not broken down, and at my suggestion Dr. Eichberg left it in place and did not further disturb the sinus. The mastoid was cleaned out thoroughly and the wound drained. Recovery was uneventful, there being no signs of sepsis, the ear became entirely dry and the perforation closed.

Two of these cases were actual sinus abscesses, well walled off at both ends and without septic symptoms. In the other two the condition had not progressed to one of suppuration, and the clot may or may not have been sterile. At any rate, there was no escape of septic material into the blood stream, and in my opinion it was justifiable to allow them to remain undisturbed as long as they were producing no symptoms. In case 1 the clot was so small that it was dislodged during inspection, or it also would have been left undisturbed.

In conclusion, I wish to make myself clear as not advocating a policy of inactivity in cases of frank sinus thrombosis with pyemia or in obscure cases where the infected sinus seems likely to be the source of high temperature or other symptoms. But in cases where there is no reason to suspect that the sinus is sending its toxins or bacteria into the blood stream it is my belief that simple drainage, if pus has formed, or leaving the clot entirely undisturbed if it has not broken down, is good surgery. Further, we must not lose sight of the fact that it is possible for the infectious process to extend after apparent healing has taken place, but this is probably no more likely in an unopened sinus than following curettement with excision, for it is necessary for a clot to form at the ends in any case, and casse of extension of the infection further along the sinus after operation have occurred very frequently.

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3. Ruttin, Erich: Diseases of the Labyrinth, p. 52-53. Rebman.

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LIV.

AN ORIGINAL METHOD OF SUBMUCOUS OPERATION ON THE SEPTUM.*

By L. Klemptner, M. D., F. A. C. S.,

Seattle.

Permanent perforation is a dreaded complication in submucous resection of the septum, especially as it generally occurs at the point of first incision, close to the entrance of the nose. Hamilton[1] counts 22 per cent perforations in 50 cases, which were examined a few years after the operation; five experienced no inconvenience from it, five complained of crust formation and bleeding, and one of a whistling sound. Capt. Stivers,[2] in a series of 133 cases, had only twelve perforations, about 9 per cent, but in immediately applying sutures he was able to cure all but one.

In examining patients in our everyday work we find frequently perforations—and some are suffering from them, too. I saw a patient last month with erysipelas of the face, which had started from an ulcerated margin of a septum perforation. I have seen two physicians, operated on by well known men, with large septum perforations—and personally I believe a large perforation is better than a small one, when I remember a patient with a small hole which created a nice whistling sound in the nose with every deep breath.

Some men are going so far as to look at a perforation as something immaterial (Katz, Fein),[3] as long as the deviation is well corrected. Most operators are in dread of them. Fear of them induced Freer to make out of a simple operation a very complicated proceeding with a big set of instruments. I have seen men losing much precious time trying to go through the cartilage and elevate the mucous membrane on the opposite side, always in fear of a perforation.

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*Read before the Pacific Coast Oto-Ophthalmological Society, August 6, 1919.

It is easier to save the mucous membrane on the concave side, as it is more relaxed, thicker, and not so adherent. But as we usually operate from the convex side, it is a difficult task just the same. All such perforations become somewhat larger afterwards through scarry retraction, but you still find Sribny[5] recommending to cut straight through the whole septum, then elevate the mucous membrane from each side. He claims to seldom have perforations. All of us probably imitate him once in a while, but against our own will.

After reading the caution in every description of a submucous resection to use care when perforating the cartilage on account of the danger of the perforation of the mucous membrane on the opposite side, I believe it must be quite a relief to learn that you can perforate cartilage and elevate the mucous membrane without any fear of perforating the latter.

I am describing a simple operation for deflected septum, where these mentioned complications can be avoided.

The operation is based on the fact that there will be no permanent perforation of the septum, even if we make incisions on both sides, as long as they are not opposite each other. We need not be afraid to make a second incision on the other side. The mucous membrane on both sides must be elevated anyway, so a smooth second incision will not delay healing, and just after a short time the place where it was made can hardly be recognized. Quite frequently extra incisions in the mucous membrane are made to help drainage and to prevent hematomata.

To describe the operation, I will use my last case, a twenty-year old marine, who suffered from a purulent inflammation of the right frontal sinus, right anterior and posterior ethmoid cells, and an extensive deflection of the septum to the right, opposite the middle turbinate. I made a submucous resection as follows:

I had the patient sit on the operating chair, cleaned the outside of nose and upper lip with alcohol; asked the patient to keep his chin close to the chest during the anesthesia so that the anesthetic would not drip down in the throat. I anesthetized both sides of the septum with cocain powder, moistened with adrenalin solution, gently rubbing it into the mucous membrane until all sensitiveness was gone. I impressed on the patient the fact that the anesthetic was the most disagreeable part on account of pain and tickling, but that the operation of itself would be absolutely painless. At the end of the cocainizing the patient had a fainting spell, and I allowed him to lay down for 10 minutes, flat on his back with lowered head.

I made a vertical incision on the left side of the septum quite close to the entrance of the nose, about 1/3 of an inch from it, with a sharp knife through the mucoperichondrium, and scraped it off with a sharp elevator for a little distance till the white glistening cartilage was distinctly visible, and the elevator penetrated easily between mucoperichondrium and cartilage. I now changed the sharp for a blunt elevator and directed it parallel with the ridge of the nose backwards and upwards without using any force, then backwards and downwards with the whole length of the shank of the elevator, just as Ballenger[2] describes it so nicely in his book, detaching the mucous membrane over the whole deflected part and some beyond it down to the floor of the nose. It was easily done, as is ordinarily the case with the concave side.

Now I transgressed from the beaten path, turned to the right nostril, where the deflection was bulging, and made a vertical incision in front of the deflection about ½ inch backward from the first incision on the opposite side, lifted the mucous membrane first with a sharp elevator so that the white glistening cartilage was visible, then with a blunt elevator detached the mucous membrane just the same as I had done on the left side. I then perforated the cartilage from this incision with my knife without having to be careful, as the mucous membrane of the other side was already detached, introduced a medium size Killian speculum, which we use for rhinoscopia media, between both mucous membranes so that the cartilage and bone were between both blades of the speculum, and removed the deflected part of the cartilage with Ballenger's swivel knife and Grünwald's alligator forceps, deflected bony part and crest opposite the middle turbinate with Killian's septal forceps, and the thick crest of the maxillary with chisel and hammer. I then made an extra horizontal incision in the posterior inferior part of the elevated mucous membrane, introduced Bernays' splint, covered with tinfoil on the side toward the septum, and sent the patient home.

The instruments I prepare are:

Nasal speculum, probe, 6 applicators, knife, Killian's sharp and blunt elevators, Ballenger's swivel knife, Killian's septal forceps, Grünwald's alligator forceps, chisel and hammer.

The advantages of incisions on both side are apparent. The most important is the absence of danger of perforation of the mucous membrane of the opposite side when cutting through the cartilage. The cartilage is already freed of the mucous membrane and therefore no special care is needed. Both mucous membranes are easier detached, the operation for each is done on the same side. The operation is therefore more quickly performed.

In case there is a subluxation of the anterior end of the triangular cartilage, I made the first incision as done by Hajek, on the edge of the cartilage, free both sides of the subluxated cartilage from mucous membrane, and remove the subluxated part of the cartilage. But even in such cases I generally make an incision on the opposite side farther back, as it is much more convenient and safer to operate from the same side, and the danger of laceration of mucous membrane is considerably diminished.

A few more details to be observed in submucous resection: It is very important to anesthetize thoroughly, even if it takes more time, for the patient is quiet and comfortable during the operation. An annoying element and cause for much delay are fainting spells in some patients. They generally occur during the anesthesia and first part of the operation, seldom afterward. I let the patient lie down flat with lowered head for five to ten minutes, and sometimes have to repeat it several times.

If the first incision must be made very close to the entrance of the nose, or on the edge of the subluxated cartilage, it is advisable to infiltrate with 1 per cent procain, otherwise the first incision may be painful and bleeding may annoy you. The mucocutaneous membrane is thick and tough, tightly adhering to the cartilage and quite difficult to detach. A sharp knife and sharp elevator should be used until the white glistening cartilage is seen and the elevator penetrates easily; then this is changed for the blunt elevator. As the membrane is quite thick there is little danger of laceration.

No deviated portion should be left. I refer especially to two places: One where cartilage, vertical plate of ethmoid and vomer meet; and the crest of the maxillary close to the entrance and floor of the nose. The first is easily removed with Killian's forceps, the second with chisel and hammer. It is remarkable how difficult it is to get the crest with biting forceps, and how easily a few tappings with hammer on chisel will loosen the whole piece. Let patient blow nose and see if both membranes are attached to each other in the middle line and if there is no bulging. Otherwise go in again between both membranes and remove bulging parts of frame with biting forceps.

According to the advice of Killian, I often make a horizontal incision in the posterior inferior part of the elevated mucous membrane at the end of the operation for drainage. I had a case, with two elderly men, where hematoma developed between the mucous membrane and which took two weeks to absorb. The reopening of incision and removal of coagulum did not help much, as new blood accumulated. I never had an abscess and do not wash the nose with any solution before the operation. I advise covering Bernays' splints on the septal side with tinfoil. It does not stick to the incised wound or laceration and is easily removed the next day without pain and with slight or no bleeding.

I allow the patient to go home immediately after the operation, as he feels quite cheerful and is not bleeding. But I caution him that in a few hours he will feel worse and the nose will start to bleed. He will not have any pain in the nose but may have a headache and probably a bad night as he will not be able to breath through his nose at all. Against severe headache I advise taking 10 grains of acetylsalicylic acid. In that way the patient knows what to expect and does not call the physician immediately to his house as if he is bleeding to death.

The mucous membrane of the concave side should always be easy to elevate without laceration, but the convex side is more difficult, as the mucous membrane is here stretched, thinner, and is more adherent to the crests. If there are no lacerations there is nothing to do after the splint is removed the next day; but if there are any lacerations, crusts will form and the healing will be somewhat delayed.

1. Kyle, "Disease of Nose and Throat," p. 311.
2. Ann. Otol., Rhinol. and Laryngol.—XXVIII, p. 60.
3. Handbuch der Spec. Chr. der ob. Luftwege III Vol., p. 335-337.
4. Arch. for Laryngologie—Vol. 18, p. 152.
5. Arch. for Larngologie—Vol. 23, p. 35.
6. Ballenger, "Diseases of Nose, Throat and Ear," p. 86.
7. Arch. for Laryngologie, Vol. 23, p. 412.

LV.

SOME OBSERVATIONS ON DISEASES OF THE FRONTAL SINUS.

By T. W. Moore, M. D.,

Huntington, W. Va.

I believe that we are not radical enough in our treatment of diseases of the frontal sinus, especially those cases that do not yield readily to the intranasal operation, or those that do, and have a recurrence year after year, or more frequently. These patients should be submitted to a more thorough operation. While many operators are able to do satisfactory intranasal work, is it not better to make a window in one sinus through which you may see each step as taken and know that the entire intranasal floor is removed?

The routine I have followed for several years is as follows:

Having done the preliminary nasal operation, which I usually do after Mosher's technic and having waited for one week or ten days, according to the severity of the symptoms, I proceed to remove the intranasal floor of the frontal sinuses as follows: The skin is painted with tincture of iodin and washed off with dilute alcohol immediately. This prevents such extensive exfoliation of the external layer of the skin as sometimes follows the application of iodin when not removed. A curved incision is then made through the eyebrow extending over the nasofrontal angle upon the nose, beginning just inside the supraorbital notch, extending about one inch. I am seldom able to go through the periosteum with the first incision although this is a desideratum. This incision is followed by profuse bleeding which must be taken care of. The periosteum is then carefully retracted, as it must be preserved. An opening is now made into the sinus with a large Alexander's mastoid gouge, which is enlarged with a rongeur until about three-fourths of an inch long and about one-half inch in width and being of an oval shape. After removing any polpi or pus that may be present, remembering to protect the mucous membrane as much as its condition will permit, the sinus is explored and the ostium located. I now insert one of these rasps into the nose from the sinus and with it break down the tissues anterior to the ostium, then with the rasps and burrs the intranasal floor of the sinus is removed until the partition between the sinuses is reached. This is broken down with a curette and then if it is feasible the same technic is followed as in the other sinus, only we must work through the opening from the sinus upon the opposite side until there is sufficient space to use the rasps, burrs, etc., through the nose. After the entire intranasal floor, of the now single sinus, have been removed and the upper contiguous portion of the nasal septum removed, the external skin wound is carefully approximated and sutured, an external dressing of a few gauze sponges is placed over the wound and a bandage applied for twenty-four hours when a cocoon dressing with collodion, is substituted and left for eight days. No after treatment is required, excepting an intranasal douche of normal salt solution to remove the secretion from the nostrils. This spares the patient the discomfort of after treatment and is one of the many good features of this operation. The introduction of a probe into the frontal sinus often gives a patient relief from pain for a varying period, but I have yet to see a case where any benefit was derived from washing out the frontal sinuses, more than the relief given by the introduction of a probe, in fact I regard the introduction of fluids into the frontas sinuses as harmful.

It will be observed that this is the Lothrop Operation with such changes in technic and instruments as an individual operator makes.

DIGEST OF AMERICAN OTOLOGIC LITERATURE FOR THE YEAR 1919.

By Otto M. Rott, M. D.,

Spokane, Wash.

I.—HEARING TESTS.

1. Callahan, John F.—Laws of the Hearing Centers and the Application of These Laws. Laryngoscope, St. Louis, 1919, XXIX, 522.
2. Callahan, John F.—Consensual Reaction of the Hearing Centers. Laryngoscope, St. Louis, 1919, XXIX, 569.
3. Dean, L. W. and Bunch, C. C.—The Use of the Pitch Range Andiometer in Otology. Laryngoscope, St. Louis, 1919, XXIX, 453.
4. Kernan, J. D., Jr.—Bone Conduction of Sound in Cetacea and Its Relation to Increased Bone Conduction in Human Beings. Laryngoscope, St. Louis, 1919, XXIX, 510.
5. Stein, O. J.—Three Reflex Signs Useful in Examining the Ears for Deafness. Laryngoscope, St. Louis, 1919, XXIX, 659.

Callahan in discussing laws of the hearing centers and their application, states his law as the proper explanation of the fact that a vibrating tuning fork placed upon the skull is much more distinctly heard in that ear the external meatus of which is closed. This is the author's law:

"When two sounds which have similar properties except intensity are transmited one to each ear, both impulses will pass to the hearing center on that side where the intensity is the greater; and there will be a summation of the two stimuli. We are, therefore, conscious of the hearing of the sound louder than if the sound of lesser intensity did not reach the ear, and also if both sounds reach each ear with equal degrees of intensity. The increase due to the summation is not equal to an arithmetical addition but follows Weber's law."

The author has noticed that the placing of a closed funnel or otherwise excluding outside noises from one ear has the same effect as directly obstructing the canal with the finger. The lateralization is explained as follows: "By cutting off extraneous sounds on one side we are able to hear the sound of a fork placed on the skull louder in that ear, and this difference is sufficient to cause a lateralization of the sound of lesser intensity that reaches the cochlea of the unobstructed ear, together with the sound of greater intensity in the obstructed ear in the hearing center on the side that receive the sound of greater intensity. There is a summation of the two sounds which is another factor in increasing the intensity."

The author then goes on to describe tests to prove his theory that the increase and lateralization of the sound in the obstructed ear is due to the shutting off of extraneous sounds, and that there is no such thing as increased bone conduction.

The reason offered for the fact that when the sound is lateralized it is not heard in the nonobstructed ear is that when the vibrations reach the cochlea on the nonobstructed side they pass from thence to the hearing center on the obstructed side via nerve tracts. This produces the summation which is a factor in the increased sound.

The two factors then in the lateralization and increase of sound in obstructive deafness are (1) Cutting off extraneous sounds and (2) the summation in that hearing center.

The author shows how to demonstrate the summation of stimuli with forks and tubes, and adds a description of the test with the dictaphone which shows how the two hearing centers act at the same time.

Callahan presents a second communication on the lateralization and summation of sounds which he calls consensual reaction in the hearing centers.

The consensual reaction of the hearing centers in the lateralization and summation of two sounds, one of which goes to each ear and which vary only in their intensity, places one more test in the hands of the psychologist and neurologist in testing the mode of action or reaction of specialized nerve centers and aids in localizing intracranial lesions.

Callahan says the neurologist in testing consensual reaction of the pupils can now pass to the ear, where we can give a similar demonstration in testing impulses that pass from one side of the brain to the other side by well recognized tracts. Any individual who cannot lateralize as per the law of the hearing centers has surely some process along the route taken by the auditory fibres that rise from the accessory nucleus in the pons, as most of the fibres arising in this nucleus pass to the other side.

Theoretically it would be possible for an individual to lateralize the less intense sound that reached the right ear, where he would be unable to lateralize if the less intense of two sounds reached the left ear. The lesion in such a case would be along the crossed fibres of the left auditory nerve.

When an individual is unable to lateralize as in Weber's test, we should at once question ourselves as to the possibility of a block somewhere in the cross fibres that connect the auditory nerve on one side with the hearing center on the other side.

The modus operandi of the consensual reaction is given by Callahan as follows:

"When a vibrating tuning fork is in contact with the forehead or teeth in an individual with two normal ears, he is conscious of hearing the fork in both ears, or as is most likely the case, he will tell you that he hears it in the center of his head. Obstruct the external auditory canal on one side and the sound of the fork is lateralized to that side. That the vibrations from the tuning fork reached both cochlae with equal degrees of intensity we will admit; but when we obstruct the external auditory canal on one side, the fork is heard with greater intensity on that side, due to excluding extraneous sounds. Then we get a lateralization of the sounds and a consequent summation in the hearing center that is on the side of that cochlea that appreciates this sound of greater intensity.

The vibrations pass to both cochlea, but the impulse does not pass to the hearing center on that side, but crosses over to the hearing center on the opposite side and is superposed on the impulse that reaches the hearing center fro mthe cochlea on that side."

Dean and Bunch have devised an instrument to test the tonal ranges of hearing which they have called the pitch range andiometer which measures the tonal range from 30 double vibrations to 10,000 double vibrations. The authors claim three distinct practical advantages for their instrument:

1. It measures the practical tonal range in much less time than can be done with the tuning forks.
2. It tests every note in the range measured while the forks test only a very few.
3. In 25% of these cases defects unsuspected after an examination with the Bezold forks, covering over an hour, have been detected in two or three minutes with their instrument.

In testing the hearing of one ear it is always necessary to use a noise apparatus. The authors claim that the results obtained by their machine may be compared to perimetry of the eye. The results are shown graphically by means of curves, certain curves being suggestive of certain lesions. The steps regulating intensity and pitch are controlled at will. The essential parts of the instrument are a telephone magnet and a toothed wheel, the latter driven by a motor. Each prong of the magnet fits snugly in front of one tooth of the wheel and a low tone is produced by having the motor run very slowly. The intensity is regulated by using the resistance in the telephone circuit as a shunt, that is, a bridge across the receiver circuit. The method of marking the graphic chart is to have the intensity steps for the vertical scale (1 at the top and 7 at the bottom) and the frequencies or pitch recorded at the bottom as a horizontal scale (200 to the left end and 3,200 to the right).

After recording the tones heard at a given intensity, the resistance is set at the next fainter step and the procedure repeated. The authors offer the following summary of the accomplishments of the pitch range andiometer:

1. It produces each and every tone within the significant range of tonal hearing without any gap whatsoever.
2. It produces a relatively pure tone, pure enough for all practical purposes.
3. It furnishes a convenient method of varying the intensity from below the threshold up to a sound that is on the verge of being painful for any pitch.
4. Both the pitch and the intensity of the tone can be measured and recorded instantly and with precision at the time of hearing.
5. The examiner can sweep through the entire pitch range at one stroke for any steps controlling intensity and to sweep through at a single stroke all the intensities for a given pitch.
6. The operation of the instrument is so simple and quick that a complete measurement can be made in a very small fraction of the time employed in making the ordinary tests now in vogue with otologists.

Kernan has made a study of the anatomic arrangement of the ears of whales in order to explain the phenomenon of increased bone conduction in human beings. After showing that whales do hear water-borne and not air-borne sounds, the author goes into a detailed description of the anatomic characteristics of ears of cetaceans. From the anatomic structures thus detailed the author presents his conclusions as to the hearing in cetaceans, and he decides that in cetacea there are all the elements normally present which have been advanced to explain the symptom of increased bone conduction in the diseased ear of human beings and the anatomic arrangements there found could certainly support the explanation of the phenomena advanced. The author's own words in concluding his report are:

"What conclusions then can we draw from the anatomic structure as to hearing in cetaceans? We have presented to us an auditory apparatus, typically mammalian, designed to receive air-borne sounds modified to one designed to receive water-borne sounds. The external meatus has been practically closed, the drum membrane fixed and the ossicles rendered immovable through fusion of the malleus to the os tympanicum. Sounds are evidently transmitted to the cochlea through the solid tissues of the head. The possibiilty of this is increased because in both forms the auditory bones themselves present on the surface of the skull a considerable bony process. In both, moreover, the periotic and tympanic are but loosely connected to the other bones of the skull. Thus they can receive only such sound waves as impinge directly on themselves. Since the malleus is firmly fused to the tympanic it would share the vibrations of that bone, transmitting them through the other ossicles to the oval window. This is probably the explanation of hearing in cetacea, that sound waves impinging either on the tympanomastoid in odontocetes, or the true mastoid in mystacocetes, are transmitted through the chain of ossicles to the cochlea, the endolymph being put into motion through the foot plate of the stapes as in other mammals.

"We may now consider the light which the mode of hearing in cetacea throws on the clinical symptom of increased bone conduction in deafness due to disease of the middle ear. It will be seen at once that any change which would connect the ossicles more firmly to the tympanic ring, approaching the complete fusion found in whales, would increase bone conduction. A tense, thickened, rigid drum membrane would do this. We could also accept Bezold's idea that it is a thick, tense ligamentum annulare, transmitting vibrations to the foot-plate of the stapes, which in some cases explains the phenomenon under discussion. This would be the condition following a radical mastoid operation. Another theory may now be mentioned. When the external canal is lightly blocked bone conduction is increased. This is explained by conceiving the air filled cavity with bony walls to be a sounding box. This is just what we have present in cetacea. In this connection it may be said that the variation in the size and number of the cells present in the human mastoid process may very well be an explanation of the variation in the response to tests of bone conduction found in seemingly similar cases of deafness."

Stein described three reflex signs useful in examining ears for deafness, especially in patients in whom the subjective element is valueless as in feebleminded patients and malingerers. If any reflex sign is elicited it is evidence in favor of some remnant of hearing left in the ear under examination.

The three reflexes are:

(1) The auricular.
(2) The pupillary.
(3) The cochleopalpebral.

A positive auricular reflex consists in a slight movement of the auricle upward or forward. A positive pupillary reflex consists in a contraction of pupil. A positive cochleopalpebral reflex consists in a movement of the upper lid.

All reflexes are unilateral in action.

II.—VESTIBULAR TESTS.

6. Carpenter, E. R.—Central Deafness. Laryngoscope, St. Louis, 1919, XXIX, 25.
7. Cohen, S.—Essentials of Barany Tests. N. York. M. J., 1919, CIX, 324.
8. Dixon, W. E.—Static Labyrinth. Northwest Med., Seattle, 1919, XVIII, 47.
9. Fisher, L. F.—Practical Value of Ear Studies. Laryngoscope, St. Louis, 1919, XXIX, 374.
10. Fisher, Lewis and Babcock, H. L.—The Reliability of the Nystagmus Test. J. Am. Ass., Chicago, 1919, LXXII, 779.
11. Hayden, A. A.—Vestibular Rotation Reactions and Routine Otolaryngologic Examination of 3,748 Applicants for the Aviation Section of the Signal Corps of the U. S. Army. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919, XXVIII, 518.
12. Horn, Henry.—The Role of the Labyrinth in Flying Efficiency. A Study of 768 Cases at the Third Aviation Instruction Center, Issoudun, France, American Expeditionary Force, from Sept., 1918, to Jan., 1919, Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919, XXVIII, 381.
13. Levy, Louis.—Vestibular Reactions in 541 Aviators. J. Am. M. Ass., Chicago, 1919, LXXII, 716.
14. Lewis, E. R.—Studies of the Ear as a Motion-Sensing Organ. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919, XXVIII, 10.
15. Lewis, E. R. and Horn, H.—Medical Studies on "Feel of the Airship," Deafmutes and Normals. Laryngoscope, St. Louis, 1919, XXIX, 65.
16. Maxwell, S. S.—Labyrinth and Equlibrium.
    I. Comparison of Effect of Removal of Otolith Organs and of Semicircular Canals. J. Gen. Physiol., 1919, II, 123.
17. Sachs, Ernest.—The Importance of More Intimate Co-operation Between the Various Specialists Who See Neurosurgical Cases. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919, XXVIII, 76.
18. Willcutt, G. H.—Vestibular Reactions in Central Nervous Diseases. Report of 3 Cases. Laryngoscope, St. Louis, 1919, XXIX, 145.
19. Wood, Ernest.—The Ear as an Aid in Diagnosis. Northwest Med., Seattle, 1919, XVIII, 157.

Carpenter reports a case of central deafness in which the vestibular tests showed that there was an apparently hopeless lesion involving both auditory tracts in the upper pons. Subsequent developments where complete recovery from symptoms due to intracranial pressure, especially in region of pons, followed a sudden discharge of pus and blood from the left ear, gave rise to the supposition that the lesion was a left-sided basilar abscess, possibly a temporosphenoidal lobe abscess, pressing against the root of the left fifth nerve with contralateral pressure of the right upper pons against the inner part of the posterior aspect of the petrous bone and attached tentorium.

In the etiology of this condition two factors can be mentioned: (a) typhoid fever at fifteen years of age and the numerous attacks of pneumonia between the ages of eleven and sixteen; (b) the occurrence of the abscess in the left ear two and on-half years ago.

Conclusions offered from a study of this case are:

1. The lesion in nerve deafness should always be located.
2. The vestibular reactions are of great value in the localization of intracranial lesions.
3. Vestibular disturbance should always be considered in the etiology of obscure gastrointestinal disease.
4. More frequent recourse to well-established surgical procedures will still further limit the number of hopeless intracranial diagnoses.

Cohen discusses the essentials of the Barany tests, and some indications for employment.

Among the conditions which call for the tests the following are mentioned:

1. Cases of vertigo.
2. Cases of spontaneous nystagmus, especially if vertical.
3. Cases of meningitis or brain conditions proper.
4. In palsy cases, especially in some of the cranial nerve palsies.
5. In cases of convulsions.
6. In cases of ataxia.
7. Blindness, especially when caused by central lesion.
8. Deaf mutes.
9. Malingerers.
10. Some cases of mental aberration.

While the tests are extremely simple and may be learned and easily executed in a short time, the difficulty is in analyzing the results.

After stating the results to be expected in a normal case, the author mentions the following propositions which are an aid to the making of a proper analysis of the results of a pathologic case:

1. If stimulation of the right ear is negative for nystagmus, vertigo, past-pointing and falling, and in addition there is as corroborative evidence total deafness of the right ear; it shows a destruction of the right labyrinth or eighth nerve on the right side.
2. If stimulation of the right horizontal canal is negative for nystagmus, vertigo, past-pointing and falling are present, the lesion is probably in the medulla between Deliter's nucleus and the posterior longitudinal bundle.

3. If stimulation of the right horizontal canal shows nystagmus and an absence of vertigo, past-pointing and falling, the lesion is probably in the right inferior cerebellar peduncle.

4. If stimulation of the right ventricals is negative for nystagmus, but vertigo, past-pointing and falling are present, the lesion is in the posterior part of the pons near the posterior longitudinal bundle.

5. If stimulation of the right verticals gives nystagmus and is negative for vertigo, past-pointing and falling, the lesion is in the right middle cerebellar peduncle.

6. If stimulation of the horizontal and vertical canals of both ears does not show nystagmus, but does give rise to vertigo, past-pointing and falling, the lesion is in the posterior longitudinal bundle.

7. If stimulation o fthe right horizontal and right vertical canals shows nystagmus, and an absence of vertigo, past-pointing and falling, the lesion is in the cerebellar nuclei.

8. If stimulation of all canals gives nystagmus but an absence of vertigo, past-pointing and falling, the lesion is at the point of decussation of the superior cerebellar peduncles.

9. If the right ear is totally deaf and stimulation of the right horizontal and right verticals gives no nystagmus, vertigo, past-pointing or falling, and in addition the left verticals show impairment or even an absence of function, the growth is located in the right cerebellopontine angle.

As an aid in the differentiation of a central from an end-organ lesion the following table is offered:

CENTRAL.	END ORGAN.
1. Spontaneous vertical nystagmus.	1. None.
2. No tinnitus, but if present, tends to get worse.	2. Present and improves.
3. Normal hearing tests with impaired or nonresponsive canals.	3. Hearing tests not normal; canals normal.
4. Disproportionate impairment of responses after ear stimulation.	4. Proportionate impairment of responses.
5. Perverted or inverse nystagmus after stimulation.	5. Nystagmus, if present, is usually normal in character.
6. Conjugate deviations following stimulation.	6. Not present.
7. Romberg present.	7. Rarely present.
8. Cranial nerve palsies very often present.	8. Rarely present.

Dixon refers to the work of Jones and Fisher and emphasizes the importance of the vestibular tests, not only to the otologist but also to the ophthalmologist, the neurologist, the syphilologist, the surgeon and the general practitioner.

Fisher discusses in simple terms the importance of the vestibular tests and explains how the phenomena are produced when the tests are made.

Fisher and Babcock have made a study of the reliability of the nystagmus test as a measure of the function of the vestibular mechanism, because this reliability had recently come to be questioned by some prominent psychologists. Fliers of 2,000 hours' flying experience were tested and in no instance was there a reduction in the nystagmus time. The conclusions offered are:

1. The duration of after-turning nystagmus is not impaired by flying. Such a very large number of aviators have been examined as to make this conclusion absolute and final.

2. From the evidence at hand, it would seem that in acrobats, whirling dancers, airdrome performers, and in athletes in general, there is no diminution of the nystagmus response. More examinations of such persons, however, would be necessary before any final conclusion should be drawn.

3. Repeated turning experiments on normal persons occasionally produce an "apparent" and slight shortening of the nystagmus, but that this is only apparent and not real is demonstrated by the convex glasses.

4. In medical practice, an absence or impairment of eye responses following ear stimulation definitely indicates a pathologic condition within the vestibular mechanism.

Hayden gives the following totals and averages of the vestibular rotation reactions of 3,748 applicants for the aviation service:

1. Nystagmus.—After turning to the right, 3,748 cases showed an aggregate of 82,231 seconds of nystagmus, representing an average of 21.9 seconds each.

After turning to the left, the aggregate was slightly larger, being 82,373 seconds, or an average of 21.9 seconds each.

2. Past Pointings.—After rotation to the right, the right arm past-pointed 7,201 times, giving an average of 1.89. The left arm past-pointed 6,663 times, with an average of 1.77.

After rotation to the left, the right arm past-pointed 8,029 times, making an average of 2.14. The left arm past-pointed 7,083 times, with an average of 1.88.

3. Of the 3,748 applicants, only 142 were rejected for abnormalities of the kinetic static sense. Of these 110 failed in past-pointing, 17 in nystagmus, and 7 in falling. Twenty-two men were nauseated and 31 more vomited.

4. Of the total number examined, 692 were rejected as being unfit to become flyers, while 3,056 were pronounced about 100% physically perfect by the examining unit. The disqualification percentage for all causes was 18.4 or 692 out of 3,748. In addition to the 142 enumerated above, 302 of these failed in the eye examination, 91 in the ear, nose and throat, and 157 in the general physical tests.

Horn writes on the role of the labyrinth in flying efficiency, basing his observations on a study of 768 cases at the third aviation instruction center, Issoudun, France, American Expeditionary Force, from September, 1918, to January, 1919.

The conclusions offered are:

1. The slight differences noted strengthen the belief that as a result of continuous air work—acrobatic work—monitor work or work over the lines the labyrinth reactions are not changed in any essential particular.

2. Among the select and the successful the hypersensitive to motion type are few and far between.

3. Many typical hypersensitive to motion types can accommodate themselves to this handicap and become successful.

4. A very considerable number of those who slipped through the entrance examinations or who were on the border line of the hypersensitive to motion type were not able to overcome the handicap and are dropped by the roadside.

5. Given an intact and well-balanced labyrinth—there is nothing to indicate that the lower nystagmus limit is of consequence even as far down as 13 seconds.

6. The normal labyrinth findings, as previously determined, are substantiated by our studies.

7. Special care should be exercised in allowing candidates with a hypersensitive to motion history and nystagmus around 30-35 seconds to enter the service. Thirty-five seconds is the extreme margin of safety.

8. With the great amount of material which America has to select from, no one should allow themselves to be influenced by the exceptions brought out in this paper.

9. Although almost any handicap of hypersensitiveness to motion can exceptionally be overcome, why should we risk the possible serious consequences?

Levy examined 541 aviators to determine whether repeated stimulation had a tendency to lessen the reactions to turning, and he has given the following summary of his work:

1. It is found that nystagmus is not diminished by repeated turnings.

2. Although vertigo was not timed, past-pointing and falling were slightly diminished in fliers of 100 hours' or more experience, being most noticeable in fliers who have had the greatest number of hours.

3. As past-pointing and falling are objective signs of vertigo, this diminution was due to the fact that the flier had learned to interpret this vertigo and for the same reason more rapidly recovered his poise.

Lewis offers the following resume of the studies of the aviation medical service concerning the ear as a motion-sensing organ.

1. Of the senses concerned in motion-sensing (such as vision, deep-sensibility, tactile and vestibular sense), the vestibular sense is the only one whose utility remains constant (either on the ground or in the air); hence the necessity of determining the aviator's possession of requisite vestibular sense.

2. Vestibular tests not only determine the functional condition of this portion of the internal ear, but give definite information concerning the integrity of parts of the medulla oblongata pons, cerebrum and particularly the cerebellum.

3. Observations made in an extensive series of blindfold experiments on normal persons, on persons with non-functioning vestibular apparatus, on persons lacking hearing only, and on persons with impaired deep sensibilities indicate that perception of motion in a linear direction.

(a) During acceleration, is sensed most accurately by those whose vestibular apparatus is functionating;

(b) At a sustained rate of speed is sensed accurately by each group except those lacking deep sensibility;

(c) During retardation is sensed accurately by those whose vestibular apparatus is functionating;

(d) Arrest of motion ensuing upon motion in a linear direction is most accurately detected by the group lacking vestibular function but in possession of unimpaired deep sensibilities.

4. Special ability to estimate correctly the degree of falsity of oft-repeated motion sensing illusions may be developed in normal persons through experience and education. This special ability enables its possessor to maintain safe bodily relation with his environment during the existence of the motion sensing illusions with which he has become familiar through long experience.

5. A superficial observation might suggest that possibly the safest aviators would be those lacking vestibular function, such as deaf mutes, inasmuch as they are incapable of developing motion sensing illusions which, in normal persons, ensue upon spinning nose dives or other whirling aeroplane maneuvers. Possession of normal functionating sensory end organs always entails the possibilities of subjective sensory illusions, but to argue the advantage of lacking such special sense end organs is, naturally, to reach the reduction ad absurdam.

Lewis and Horn have made some studies on motion sensing or "the feel of the airship" on deaf-mutes and normals. In this study it has been demonstrated that men with normal inner ears when blindfolded were able to detect motion changes during flight, whereas blindfolded deaf-mutes with destroyed labyrinths were not.

The authors have demonstrated by their series of experiments—the results of which are detailed—that man's ability to sense motion is measured by the full possession of visual acuity, deep sensibility (muscle sense), vestibular sense acuity and tactile sense. And particularly, that the "feel of the airship" which is the sense complex that makes for a first-class pilot, requires normal vestibular motion sensing.

Experience in aeroplane flights shows that blindfolded normal persons perceive motion changes accurately; that blindfolded persons lacking normal vestibular apparatus do not.

One who shows good responses in the turning chair shows good detection of movement in the air. One who shows poor responses in the turning chair shows poor detection of movement in the air.

Maxwell has made some experiments on the comparison of the effect of removal of otolith organs and of semicircular canals from the results of which he is convinced that the assumption of a sharp differentiation of function between the otolith bearing vestibular portions of the labyrinth and the semicircular canals is not justified by the facts. Between the effects of extirpation of the one and of the other set of structures there is more resemblance than contrast. They certainly reinforce each other, for the reactions produced by either one alone are always slower and less vigorous than when both sets of organs are intact. It would not, however, be safe to affirm that the functions are identical. In one respect a difference is apparent, namely, in the response to rotation in a horizontal plane. If the ampullæ are uninjured, compensatory movements occur when the animal is rotated around its dorsoventral axis. Maxwell has never seen this reaction in the absence of the ampullæ of the horizontal canals.

In discussing the importance of a more intimate co-operation between the various specialists who see neurologic cases, Sachs gives his views on the value of the Barany tests in a localizing diagnosis. Sachs always has these tests made out, as this examination is merely the examination of one-half of one of the twelve cranial nerves, and as some of the pathways of the vestibular fibres have never had any anatomic proof, he uses the results merely as corroborative evidence—that is, if all other findings are negative, he is willing to subject a patient to operation when only the Barany is positive.

Sachs advises that the specialists take a greater interest in the nervous system as a whole, rather than in that portion pertaining only to their specialties.

Willicutt draws attention to the close association existing between the neurologist and otologist, especially in those cases of nervous disease where the prominent symptoms were labyrinthine, hence the patient's reason for first seeking an otologist.

When the aurist recognizes the fact that many labyrinthine phenomena are but the earliest manifestations of disease of the central nervous system, he is able to send the patient for a neurologic study and often by timely diagnosis and treatment render valuable assistance to the patient while still in the curable stage.

Three case reports are added, two of early multiple sclerosis and one of latent syringomyelia.

Wood refers to the aids which a thorough examination of the vestibular branch of the auditory nerve offer to the neurologist, syphilologist, surgeon, ophthalmologist, internist and general practitioner.

III.—DISEASES OF THE EXTERNAL EAR.

20. Rosenkranz, Otto H. G.—Maggots in the Ear. J. Am. M. Ass., Chicago, 1919, LXXIII, 767.

Rosenkranz reports a case of maggots in the ear. Seventy-five maggots were washed out the day after a fly flew into the external auditory canal.

IV.—NON-SUPPURATIVE DISEASES OF THE MIDDLE EAR; OTOSCLEROSIS.

21. Holmgren, G.—Radium Therapy in Tubal Stenosis. Laryngoscope, St. Louis, 1919, XXIX, 590.

22. Taylor, J. M.—Hearing and Its Regulation, Especially in Middle Age and Early Senescence. Med. Rec., N. Y., 1919, XCV, 56.

Holmgren reports three cases of tubal stenosis producing exudative catarrh of the middle ear, which were benefited by the application of radium to the pharyngeal orifice of the tube. The benefit occurs because lymphoid tissue is susceptible to the action of radium.

Taylor discusses the subject of voluntary improvement and conservation of hearing, especially in middle age and early senescence, emphasizing the importance of attention and self-regulation of the patient to his function of hearing.

The chief objectives are (1) to achieve conscious control over all parts concerned in hearing, direct and associated, i. e., in training of voluntary and semi-voluntary structures and (2) to direct intelligent attention, critical and helpful, to elaboration, cultivation and refinement of the function of audition, to bring up to par all the latent powers which reside in the aural equipment as a whole.

The following procedures are recommended:

1. Passive motions, manipulations applied to the structures; seize the concha with the encircled fingers, draw it up and down, backward and forward, round and round; in applying manipulation to the neck, the posterior scalp—which is usually found rigid and adherent—also to the dermal structures over the second, third and fourth thoracic vertebrae (vaso-motor subcenters) by pressure and relaxation, by lifting and pulling the overlying skin, and also by mobilizations of the joints of these vertebrae at corresponding levels by alternating pressures.

2. Making active movements of the jaws, opening widely as possible, rotating, side to side, forward and back; also in yawning and swallowing afterwards.

3. Active movements of the neck, to the right, to the left, also thrusting the chin forward each time: then chin up vertically, forward and back.

4. Inducing the patient to seize the back of his head with hands clasped and to bend far forward and down, then to push the hands back with the head (neck muscles) and repeat five or six times with increasing force.

The whole procedures occupy about six or eight minutes and should be repeated at least once, preferably three times daily.

V.—SUPPURATIVE DISEASES OF THE MIDDLE EAR AND MASTOID.

23. Alexander, C. J.—A Case of Probable Metastatic Carcinoma of the Middle Ear. J. Am. Inst. Homeop., 1919, XI, 1404.

24. Canfield, R. B.—Pathology of Mastoiditis: Its Clinical Significance. J. Mich. M. Soc., Detroit, 1919, XVIII, 524.

25. Clark, J. Sheldon.—Immediate Closure in Selected Cases of Acute Mastoiditis. Illinois M. J., Chicago, 1919, XXXVI, 249.

26. Davis, G. E.—Blood Clot Dressing in Mastoidectomy. Modified Technic Which Assures Primary Painless Healing Without Deformity. Preliminary Report. J. Am. M. Ass., Chicago, 1919, LXXVII, 169.

27. Dickens, T. A.—Mastoid Operation Under Local Anesthesia. Texas State J. of Med., 1919, XV, 290.

28. Eagleton, Wells P.—The Reconstruction of the Mastoid Cavity by the Use of Bone Grafts and Chips. Laryngoscope, St. Louis, 1919, XXIX, 272

29. Gerber, I.—Mastoid Structures as Revealed by Roentgen Ray Examination. Am. J. Roentgenol., 1919, VI, 1.

30. Goldstein, M. A.—Local Anesthesia and the Mastoid Operation. Laryngoscope, St. Louis, 1919, XXIX, 559.

31. Guttman, J.—Limitations of the Diagnostic Value of the Skiagram in Diseases of the Nose and Ear. Laryngoscope, St. Louis. 1919, XXIX, 472.

32. Harris, T. J.—Our Experience at Fort Oglethorpe, Ga., with Acute Affections of the Middle Ear and the Mastoid Following Measles. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919, XXVII. 50.

33. Harris, T. J.—Acute Mastoiditis: A Clinical Study Based on Cases Seen in the Oto-Laryngological Service U. S. General Hospital 14, Fort Oglethorpe, Ga. Laryngoscope, St. Louis, 1919, XXIX, 540.

34. Harris, T. J.—Severe and Uncontrollable Hemorrhage Following Mastoidectomy in a Patient Suffering from Purpura. N. York M. J., 1919, CX, 311.

35. Hays, H. M.—X-Ray Diagnosis of a Case of Acute Mastoiditis with No Mastoid Symptoms. Laryngoscope, St. Louis, 1919, XXIX, 660.

36. Hill, F. T.—A Study of the Aural Complications of the Recent Influenza Epidemic with Special Reference to the Clinical Pitcure Laryngoscope, St. Louis, 1919, XXIX, 351. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919, XXVIII, 497.

37. Holmes, C. R.—Presentation of Mastoid Cases. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919, XXVIII, 1.

38. Kahn, Alfred.—Two New Instruments for Reaming the Upper End of the Eustachian Tube in the Radical Mastoid Operation. Laryngoscope, St. Louis, 1919, XXIX, 143.

39. Kahn, A.—Method of Using Dakin's Solution for Continuously Irrigating Mastoid Wound. Med. Rec., N. Y., 1919, XCV, 61.

40. Kelly, J. D.—Acute Purulent Otitis Media and Acute Mastoiditis at the Base Hospital, Camp Stuart, Va. Med. Rec., N. Y., 1919. XCVI, 408.

41. Lawrence, G. H.—Acute Suppurative Otitis Media. Wisconsin M. J., 1919, XVIII, 95.

42. Lewy, Alfred.—The Operative Treatment of Chronic Suppurative Otitis Media. Illinois M. J., Chicago, 1919, XXXVI, 185.

43. Porter, C. T.—Mastoidectomies Under Local Anesthesia: A Brief Report of Nine Mastoidectomies (One Double) Under Local Anesthesia at Base Hospital, Camp Upton, N. Y. J. Am. M. Ass., Chicago, 1919, LXXII, 546.

44. Potts, John B.—Mastoidectomy: Postoperative Treatment by the Use of Surgical Solution of Chlorinated Soda and Modification Necessary to Secure the Best Results. J. Am. Ass., Chicago, 1919, LXXIII, 605.

45. Sautter, C. M.—Chronic Discharging Ear. N. York M. J., 1919, CIX, 461.

46. Scott, J. R., et al.—A Study of Acute Mastoiditis at Fort Riley, Kansas. J. Am. M. Ass., Chicago, 1919, LXXII, 1122.

47. Simpson, W. L.—Unusual Mastoid Case. Tennessee State M. Ass. J., 1919, XII, 56.

48. Smith, J. M.—Streptococcus Mucosus Capsulatus Infection in the Mastoid. Med. Rec., N. Y., 1919, XCV, 18.

49. Smurthwaite, H.—Chronic Suppurative Media in the New Army Plea for Treatment in Its Earliest Stages. J. Roy. Army M. Corps, Lond., 1919, XXXII, 301.

50. Stickney, Otis.—Report of Two Cases of Abducens Paralysis Occurring in Acute Suppurative Otitis Media with Mastoiditis. Laryngoscope, St. Louis, 1919, XXIX, 395.

Alexander reports a case of probable metastatic carcinoma of the middle ear. The patient had her right breast removed three years ago because of a carcinoma and, according to the history, throat and laryngeal symptoms, cough, choking sensation, aphonia and difficulty in swallowing were the first to manifest themselves, hence these parts must have been the first to be involved and extension to the middle ear subsequently. A growth was found in the right side of the pharynx and there was complete immobility of the right vocal cord. The right drum was immovable by compression and aspiration excepting a small area in the anterior and posterior superior quadrants. The lower half of the drum membrane was of a bluish red color as if blood were behind but not against it. There were three small vertical folds in the posterior superior quadrant and fixation of the malleus. Pronounced well-formed blood vessels were seen to extend from the roof of the external canal down over the drum membrane anterior and posterior to the short process of the malleus. There were also many blood vessels extending outward from the drum membrane in all directions, but especially marked on the floor and posterior wall of the external canal. There were no clinical signs of labyrinthine involvement.

Canfield describes the pathologic changes occurring in mastoiditis, acute and chronic, and discusses the clinical significance. He states that pus is probably present in the antrum and neighboring mastoid cells in every case of suppurative otitis media, but this does not mean bone infection. As long as the pus makes its escape freely into the middle ear the disease in the mastoid may be limited to hyperemia, swelling and small-celled infiltration of the antral lining membrane. When, however, the infection is of sufficient virulence or when drainage is interfered with, either by the formation of granulation tissue in the aditus or by the presence of pus in the mastoid cells, escape from which is for anatomic reasons impossible, retention takes places, the bone is attacked and mastoiditis is set up. The cell first affected is the mastoid antrum, the mucoperiosteal lining of which becomes densely infiltrated and suffers a loss of substance. The antrum then becomes filled with infected granulation tissue and pus. This serves as a primary focus from which extension of the disease process takes place as the result of:

1. Direct extension due to pressure of the pus and granulation tissue upon the mucoperiosteum through which course the nutrient vessels of the mastoid cells. The result is destruction of these vessels, necrosis of the walls of the antrum and enlargement of the primary focus.

2. Gravitation of pus into remote parts of the mastoid and formation of secondary foci of disease.

3. Extension by means of vascular channels.

The clinical significance of this knowledge is that it is impossible to determine where necrosis ends and healthy cells begin, so the safest procedure is to remove all cellular structures wherever found.

Chronic mastoiditis presents four different and distinct processes:

1. Hypertrophy and hyperplasia of the mucoperiosteal lining with conversion into chronic granulation tissue, when the lining loses its epithelial layer. This tissue may persist or may be transformed into (2) bone with complete eburnation or sclerosis.

3. If the hyperplasia of the antral mucosa is sufficient to prevent the escape of pus into the middle ear, necrosis of the mucous membrane follows, exuberant granulation tissue forms, the blood supply of the walls of the antrum is cut off and caries results. Extension of the necrotic process can take place beyond the confines of the mastoid cells into the brain or sinuses. Caries and sclerosis are almost always associated, in which case it generally happens that caries is most marked in the tympanum and in the neighborhood of the antrum, while sclerosis is most marked in the more superficial areas. The result is that the deeper parts are converted into an abscess cavity, the purulent contents of which is in intimate contact with the brain, while the superficial parts form a wall of dense ivory-like bone which renders perforation and escape of pus externally impossible.

4. Cholesteatomatous formation. This consists of an ingrowth of epithelium. This is a curative process if no caries exists and the suppurative process is of a low grade. If, however, the discharge is profuse or if caries exists, proliferation and desquamation are very rapid. The walls of the antrum become lined with this newly-formed membrane of epithelium and when partial obstruction occurs the discharge collects under pressure sufficient to destroy the walls of the antrum and neighboring cells. When associated with caries the pressure of the cholesteatoma is frequently sufficient to destroy the walls of the mastoid and to allow infection to reach the internal ear or brain.

The clinical significance of chronic mastoiditis depends upon the fact that one never can foretell the extent to which the necrotic process has advanced, and inasmuch as 75% of all brain abscesses and the majority of all cases of suppurative mastoiditis are of otitic origin, and as the dura and sinuses can be involved without the causation of symptoms, the presence of a chronic discharging ear cannot be regarded with composure by even the most optimistic.

Clark advises immediate closure of the mastoid wound in mild cases of acute mastoiditis. This advice is based on one successful case in which drainage was procured through the external auditory canal by means of lowering the facial ridge and making a plastic flap as is done in the radical operation. In this case reported the patient left the hospital on the sixth day and was back to work in two and one-half weeks. Drainage was obtained by means of xeroform wool.

Davis offers a modification of the blood clot dressing in mastoidectomy, which consists essentially in rendering the wound cavity aseptic by antiseptics at the time of the operation and iodoform packing preceding the admission of the blood clot. The author's technic is as follows:

All infected and diseased tissue possible consistent with safety is exenterated. In simple mastoidectomy after thorough exenteraation of the mastoid and the establishing of free communication from the antrum into the tympanum, a free incision of the membrana tympani is made with a piston syringe, the tympanum is flushed from the mastoid through the canal with 3% iodin solution and then with warm alcohol, followed with warm sterile physiologic sodium chlorid solution. Then the mastoid is packed with iodoform gauze and closed to the lower angle save for a space that will permit one end of the gauze to protrude.

In twenty-four hours the packing is withdrawn and the bleeding occasioned by its withdrawal allowed to fill the wound cavity. If enough blood is not forthcoming, a nick or cut with a knife or the scissors is made in the angle or margin of the flap to supply sufficient blood to fill the cavity. The lower angle of the wound is closed with adhesive plaster.

Silkworm gut is used for suture material, and before removal a 3% solution of iodin is applied to prevent possible infection of the clot.

After a radical mastoid the gauze is inserted and removed through the canal, then the meatus is covered with a film of cotton or layer of sterile gauze covered with petrolatum and a bandage.

The advantages of this modified technic are:

1. The opportunity to sterilize the wound with antiseptics at the time of the operation.
2. The completion and maintenance of this sterility by the iodoform gauze packing of the wound for twenty-four hours, which prevents the infection from the deeper tissues that may occur from the operation reaction drainage when the clot is inducted at the time of the operation.
3. Its simplicity and effectiveness, which enables the average surgeon to use it successfully in or out of hospitals.

The author reports nine cases in eight of which there was primary healing without deformity, quick convalescence, no painful aftertreatment and marked improvement in hearing.

In one case there was healing with slight deformity at the lower angle of the wound where the clot broke down. This was an acute case complicated with large subperiosteal and perisinus abscesses, plus a sinus thrombosis in an alcoholic and syphilitic.

Dickson uses novocain along the auricularis magnus and occipitalis minor and over and around the tip, down the side of the canal and above the zygomatic ridge. After the mastoid is exposed the tip is opened with rongeur forceps. When the cells have been cleaned up to the antrum and this cavity opened, the solution is introduced and left until the field is thoroughly cleansed. The author is very enthusiastic regarding this procedure.

Eagleton discusses reconstruction of the mastoid wound cavity by the use of bone grafts and chips, reporting his experience in two cases. In one the transplantation was done at the time of the mastoid operation, and in the other case the transplantation was performed at a secondary operation following the sterilization of the wound cavity by the Carrel-Dakin method, with better results, but in both cases the ultimate result was ideal—a smooth, flat surface covering the former mastoid cavity.

The advantages cited for this method of closure are that (2) it does away with the painful dressings; (b) renders less likely secondary infections, and (c) lessens the possibility of a recurrence of the original infection.

The prerequisites to this method of closure are (1) eradication of the infection by a complete operation with a perfect aseptic technic at the time of operation; (2) the filling in of the cavity of the mastoid so that no extensive vacant spaces will remain for the accumulation of blood in which the remaining bacteria and those in the neighboring middle ear may propagate; (3) the erecting of a barrier posterior to the iter tympani et antri, in order that, while a cavity is left into which the mucous membrane of the middle ear can proliferate, this cavity be a small one—an antrum—thus imitating nature's process of repair.

Gerber refers to the different types of mastoid structure and the importance of the different types in determining the result or course of an infection, and then goes on to show that these different types can be recognized by means of stereoradiography.

The three types of diploic mastoids are:

Type 1. Persistence of the infantile type in which the mastoid mass is diploic. In this type the thin outer compact layer of the antral wall has increased in thickness from the periosteal side and is of extreme density; the inner layer of "fetal cells" is still seen; the mastoid mass is entirely diploic, and the separating layer between the diploe and the cavity of the antrum is much increased in thickness.

Type 2. Persistence of the infantile type in which the mastoid mass is dense. With exception of the mastoid mass, which is dense, the structures are as described under Type 1.

Type 3. The mixed infantile and pneumatic mastoid, with the infantile characteristics predominating.

The radiogram, especially when a stereoscopic study is made, will practically always show the sinus to be far forward in the infantile types. When to this appearance is added a suggestion of cell structure towards the tip of the mastoid and a cellular area just above and behind the middle ear, the remainder of the mastoid appearing dense, in the writer's experience, Type 1 is to be confidently expected. When the entire mastoid appears dense, with the exception of a small cellular area, often but a faint suggestion, just above and behind the middle ear, Type 2 is to be expected. When to one or the other of the above findings there is added a small group of large cells, though they be but faintly outlined, Type 3 is to be looked for.

The other types of pneumatic mastoids are:

Type 1. The pure pneumatic type, practically all of the cell structures containing air.

Type 2. The mixed pneumatic and infantile mastoid with the pneumatic characteristics predominating.

Type 3. The "double-decked" mastoid. The cells are arranged in two tiers, separated one from the other by a bony septum which in location and general appearance often closely resembles the internal table.

The author then sums up the practical aids from this radiascopic recognition of variations in mastoid structures.

In the infantile type, by recognition of their presence, a chronic infection of the mastoid can be prevented by early drainage of the antrum, regardless of the absence of the classical mastoid signs. If there is merely a middle-ear suppuration, with definite drooping of the posterior superior canal wall, and an infantile type of mastoid disclosed by the Roentgen-ray examination, the patient should be given the benefit of the doubt by early antral exploration.

With the pneumatic type of mastoid, however, even in the presence of stormy symptoms, operation should not be hastened at the outset. The re-establishment of positive mastoid pressure by means of proper punctures of the drum membrane may be sufficient to produce prompt cure. Of course, if actual destruction of the cell-walls, or the presence of a perisinus or epidural abscess, can be made out, then the indication for operative interference is definite.

Goldstein reports a series of twenty acute mastoidectomies successfully performed under local anesthesia. A 10 c.c. all-metal syringe and all-metal plunger is used with a needle two and one-half inches long and of fair lumen. The most satisfactory anesthetizing solution is one-half of one per cent novocain in distilled water, to which may be added one to ten thousand solution of adrenalin in equal parts.

With a standard hypodermic syringe and needle the subcutaneous injection is made, beginning with the mastoid area in the zygomatic line and working toward the tip. The infiltration includes a belt of about one inch in width and extends from the insertion line of the auricle backwards and parallel to it. The deep injections are then undertaken with the heavier metal syringe and needle, beginning at the same point on the zygomatic line and covering the distance to the mastoid tip at about four points. For the deep injections the larger needle is plunged in a slanting direction downwards until the point engages the mastoid bone. By a slight rotary motion of the hand the needle is worked between the periosteum and the bone and 5 or 6 c. c. of fluid forced into the area. The same technic is carried out at the other three selected points from the zygomatic line to the mastoid tip and in the injection at the tip, the slant of the needle is directed upward toward the head, instead of downward toward the neck. These two injections, deep and superficial, effect an area of anesthesia throughout the field of operation. The classical incision is now made parallel with the insertion line of the auricle and cutting in one sweep from the zygomatic line to the tip, and to the bone.

Before elevating the periosteum forward and backward, and applying retractor, a suitable pledget of cotton, soaked in 10% solution of sterile cocain, is placed in the wound for four or five minutes. The one difficult area to anesthetize during the mastoid operation is the posterior wall of the auditory canal and the middle ear cavity proper. To accomplish this satisfactorily the larger injection needle is passed to the depth of the mastoid incision just made between the periosteum and the bone and carried to the fundus of the canal as far as possible. Two or three cc. of solution are delivered at this point. If the operation is undertaken simply for mastoid cell exenteration and drainage of the antrum, this one injection into the depth of the canal wall will suffice.

Guttman in discussing the limitations of the diagnostic value of the skiagram states that as a deciding factor in the indication for mastoidectomy it is at the present time of very little value. But it has some points of value. For instance, it may determine the course of the lateral sinus and may aid in differentiating cases of furuncle of the external auditory canal and mastoiditis when the clinical picture points to either one or the other.

Harris offers two important deductions from his experience with acute affections of the middle ear and mastoid following measles:

1. Otologic complications are so unusual in their symptomatology that the only certain means of recognition is the routine examination of the ear itself.

2. Far outweighing all measures addressed to relieving infection of the ear is prophylaxis to prevent such infections from developing, such as improved sanitary procedures and local treatment of the upper respiratory tract by means of gargles of warm saline, Dobell's or 2% solution of dichloramin-T. Finally, the establishment of steam-huts may be of great service.

Harris offers another contribution on acute mastoiditis in which, besides repeating his observations just recorded concerning the ear complications of measles, he offers some remarks concerning the aural complications of influenza:

1. The drum picture. The presence of the characteristic hemorrhage bleb is noted.
2. Not much reliance could be placed on drooping of the posterior superior canal wall as an indication for operative interference.
3. Thickening of the periosteum over the mastoid was a valuable aid in the diagnosis.
4. While great reliance was placed on the roentgenoscopic findings, these are not infallible.
5. The operative findings varied. Little or no changes were noted in mastoids opened early.
6. There was no uniformity in the nature of the organism recovered.
7. There were marked slowness in the time of healing.

Harris reports an interesting case of severe and uncontrollable hemorrhage following mastoidectomy in a patient suffering from purpura. During the little more than two weeks following the operation there was constant oozing, but the bleeding was finally controlled. During this period 1,400 c. c. of human blood was transfused. Locally coagulen oils and hemoplastin were used, the latter apparently giving the best results, but the bleeding from the mastoid wound was not controlled until the wound was sutured.

In commenting on this case, Harris discussed the difference between hemophilia and purpura. Hemophilia is a hereditary disease characterized by a deficiency in one or more of the clotting properties of the blood which results in prolonged coagulation time. Purpura, representing many different conditions, is characterized by a deficiency of the blood platelets. Hemophilia is likely to occur in males, although it is transmitted through the female. Purpura occurs both in the male and the female. The bleeding in hemophilia occurs usually after injury; that from purpura is likely to occur spontaneously, and is characterized by frequent subcutaneous hemorrhages. In hemophilia there is a deficiency in the amount of prothrombin; in purpura it is normal.

In the present case the purpura was of the hereditary type, as the patient had two brothers die from hemorrhage. In other respects the features characteristic of purpura were present.

Hays describes a case of acute mastoiditis with no mastoid symptoms in which the diagnosis was made by means of the X-ray. True there had been recently an acute suppurative otitis media and since this the patient complained of an uncomfortable feeling in that ear. The discharge had ceased, there was no temperature nor tenderness on pressure over the mastoid, but the X-ray showed absence of cell outlines in mastoid. Operation revealed mastoid completely filled with pus and no communication between antrum and middle ear.

Hill presents the following conclusions from his study of 120 cases of acute suppurative otitis media following 6,870 cases of influenza occurring at the U. S. A. General Hospital No. 14.

1. Otitis media was an infrequent complication of influenza and occurred more frequently in cases developing pneumonia. There were 1,600 cases of pneumonia and 66 of the cases of otitis media occurred among these. Of the 120 cases, 17 were bilateral and 16 of these occurred among the pneumonia cases.
2. The type of otitis media shows first a hyperemia and then an acute hyperplasia or hyperplastic edema of the mucous membrane of the middle ear.
3. This give a certain definite and characteristic picture including a drooping of the canal wall. This last sign is not indicative of a suppurative mastoiditis.
4. The operative signs indicative of suppurative mastoiditis are: Increased purulent discharge and thickened mastoid periosteum. Mastoid tenderness and edema, if present, together with these signs, are added arguments.

Holmes discusses mastoid cases seen at Camp Sherman, emphasizing the importance of early operation and pointing out certain reasons for poor results, namely:

1. Constant reinfection of the wound from nasopharynx, eustachian tube and tympanic cavity, especially in the presence of a nasal sinusitis, whose activity is influenced by such factors as constipation, overloading of the stomach with food or alcoholics, and undue exposure with the lowering of the inhibitory powers of vascular tone.
2. Overcrowding.
3. Infection by contact.

In conclusion Holmes wisely advises the aural surgeon to look upon every discharging ear as one that may lead to fatal complications, to watch every symptom, and to bend all his energies toward preventing further progress, to adopt the rule that pus must be sought for the moment its presence is suspected and then promptly to drain and remove the cause.

Kahn has devised a curette and a burr for reaming the upper end of the eustachian tube in the radical mastoid operation. The curette is called a mouse-nosed eustachian curette. The curette end of the instrument consists of quite a long spoon tapering to a point. The sides of the spoon are very sharp and fine-cutting. The spoon is tipped at its apex by a probe-like nose which does not extend out from the spoon but gradually tapers into it. The spoon tapers into a long handle. The beaded nose acts as a feeler, and prevents piercing soft parts.

The burre is tipped and tapering similar to the curette and can enter the tube much deeper.

Kahn describes his method for using Dakin's solution for continuously irrigating the mastoid wound. One long rubber tube projects from the upper angle of the wound and a short tube from the lower angle. The upper tube projects beyond the dressing and is attached to the syphon tube. A miniature Kelly pad, on which the head rests when patient is in bed, carries away the fluid. When patient is in an upright position, a pad, the lower portion of which is shaped like a funnel, is made a part of the dressing and directs the solution into the lower funnel-shaped portion from which it flows out.

Kelly offers the following conclusions from his study of nearly 200 cases of acute otitis media purulenta and some 48 cases of acute mastoiditis at the Base Hospital, Camp Stuart, Va.:

1. It is very difficult to obtain a pure culture or to know the inciting organisms in acute purulent otitis media.
2. Mixed cultures will invariably be present after 24 hours of discharge.
3. The presence in a discharge of virulent pyogenic organisms does not necessarily mean that mastoid involvement will follow.
4. The individual anatomic characteristics of the mastoid may not be a deciding factor in the development of mastoiditis.
5. Acute purulent otitis media should never be syringed with the hope of irrigating the middle ear. Free drainage with or without wicks is the treatment to follow, keeping the canal free from obstruction. A piece of absorbent cotton may be placed in the auricle to absorb the secretion and this covered with a handkerchief or bandage.
6. The X-ray in acute mastoiditis is not to be depended upon for diagnosis.
7. An acute purulent otitis media lasting over three weeks and discharging freely all that time invariably means mastoid involvement and should receive operative treatment in order to preserve hearing and protect against the condition of becoming chronic.
8. A complete exenteration of all possibly affected cells should be done at the time of the operation.

Lawrence offers a rational exposition of the subject of acute suppurative otitis media. He emphasizes particularly the importance of preserving an aseptic condition of the meatus so as to prevent a staphylococcus infection as this nearly always produces chronicity. The author prefers the dry treatment by means of the cotton wrapped applicator and suction, to the irrigation plan, as there is less likelihood of producing a secondary infection. Lawrence condemns the practice of swabbing the nasopharynx in the acute infectious diseases as this procedure causes gagging and forcing of the infected secretions up the eustachian tube.

Lewy discusses the indications for operative interference and the choice of operation in chronic suppurative otitis media.

Factors to be considered in deciding for or against operative interference are:

1. The economic condition of the patient or his social status, as the latter may be of such a nature that prolonged nonoperative care may be impractical or even impossible.
2. The urgency of the case relative to intracranial or labyrinthine complications.
3. The probability of their developing serious complications.
4. The amount of disability or discomfort caused.
5. The probability of cure by less radical measures.

As to the type of operation, the author mentions ossiculectomy and the modified operation in selected cases, but the radical operation is the most reliable.

Porter gives a brief report of 9 mastoidectomies (one double) performed under local anesthesia. The patient was first given ¼ gr. morphin subcutaneously, and in half an hour a 0.5 per cent solution of cocain or procaine was injected into the skin along the line of the proposed incision. The injection was then carried into the deeper layers and finally under the periosteum over the entire area of the mastoid. The insertion of the sterno-mastoid muscle and the posterior canal wall were injected at the last. About 15 cc. of .5 per cent solution were used in each case. After waiting for from 5 to 10 minutes the operation was started.

Potts discusses the postoperative treatment of mastoidectomy by the use of surgical solution of chlorinated soda, and states that this method has the following advantages:

1. It enables the operator to close his wound and still feel that he has as perfect drainage as it is possible to secure.
2. Exposure of the sinus or dura is no contraindication to closing the wound.
3. The ultimate result is a smooth, clean scar without depression.

In a series of 50 cases the average time in which the wound became sterile and the tubes could be removed was 9.35 days. All secretions had ceased and the wound was entirely healed in most of these cases by the fourteenth day and none longer than the eighteenth day. The shortest time in which the tubes were removed was four days and the longest time was eighteen days. The discharge from the external auditory canal ceased in from one to twenty-one days. Potts inserts two tubes; one extending from the time of the mastoid process to the upper angle of the wound and the other from the antrum to the lower angle of the wound. From ½ to 2 inches of the tubing is left out of the bandage and fastened with a strip of adhesive to temporal region of forehead. About one ounce of the solution is allowed to flow through each tube every two hours for the first two days. After this the irrigation is continued every two hours during the day and every four hours during the night. Dressings are changed daily. As the secretion diminishes, the interval of irrigations is lengthened. When secretion is sterile as determined by culture the tubes are withdrawn. Aseptic precautions are observed in irrigating. In some cases where after four or five days the secretion became profuse, thick and brown, benefit was obtained by flushing wound with boric solution or hydrogen peroxid, removing and sterilizing tube and insert and irrigate for 24 or 48 hours with mercuric chlorid solution 1-5000.

Sautter emphasizes the dangers of an untreated chronic suppurative otitis media, and draws attention to its frequency. In the 357 cases referred to the advisory board by the local boards, 187 were refused active service because of a chronic supurative otitis media.

The author divides all cases into three groups, as follows:

Group 1. Those cases that are tubal in origin, the infection coming from nose or nasopharynx. Correction of the latter is the best treatment for the aural discharge.

Group 2. Those cases due to some lesion in the cavum tympani, such as a foreign body, granulations, polyp tissue or an exostosis. Local treatment frequently is all that is necessary for cases in this group.

Group 3. Cases in which the discharge comes from the mastoid cells and is inaccessible to local treatment. These require the radical mastoid operation.

Scott, et al., have made a study of acute mastoiditis at Fort Riley, Kansas, from which they have drawn the following conclusions:

The prevalence of mastoiditis in army cantonments is due to a number of reasons. The new surroundings of the recruit play some part in it and constitute a predisposing cause. The presence of a locality infection and epidemics of acute contagious diseases are the chief factors.

2. Invasion of the middle ear and mastoid cells may occur by extension from the nasopharynx or directly from the blood stream.

3. The anatomic structure of the mastoid body is of importance in the prognosis of each case. Radioscopy will alone determine the character of the cell arrangement.

4. For clinical purposes, the mastoid may be classified as Type 1, rudimentary or cell-free mastoids; Type 2, in which the cells are of the pneumatic variety and are found only below a horizontal line drawn through the upper margin of the meatal ring, as shown in the radiogram, and Type 3, showing small cells extending forward in the zygomatic region, high posterior cells, and many delicate cells in the tip. Type 1 mastoids rarely if ever develop acute mastoiditis, but the otitis media is the most marked of all types. In this class of cases, operation reveals the sinus clinging closely to the posterior wall. Type 2 is the most serious of the three and almost always requires operation. The cells of the tip and posterior are of the pneumatic type. The drainage is poor, and necrosis occurs early and may be fulminating in character. Type 3 is characterized clinically by an early tenderness over the entire mastoid area which subsides on the application of hot compresses. They drain easily and seldom

require operation. Mastoiditis is associated with otitis media in only Types 2 and 3. As Type 1 may be due to faulty development or to an otitis media in early childhood, a large number of mastoids of this type are found. This accounts for many severe otitis media cases that show no clinical evidence of mastoiditis, although a high temperature and even chills may occur.

5. Bone necrosis is the one important sign in mastoiditis which must be carefully sought. Its presence makes operation imperative. It occurs in Type 2 with little or no clinical manifestation until the tip and posterior cells become necrotic. Fulminating signs then appear. When operation is indicated, it should be thorough.

6. Chloramin-T paste is a good dressing to use in the after-care of patients.

7. Blood stream invasion may cause the mastoiditis, and with it involvement of structures within the cranium. In such cases meningitis may be hastened by a prolonged operation. Socalled otitis meningitis is a very rare complication. Septic joints, pericarditis, meningitis, or abscess of the brain due to the primary invasion may develop, early or late, in the course of the illness. Sinus thrombosis is easily differentiated by the presence of the chill and the rapid rise and fall of temperature.

Sheehan reports a case of acute mastoiditis successfully performed under novocain and morphin anesthetic. Success depends upon proper anesthesia of skin, periosteum, aditus and membrane of the middle ear. The bone has no sensation. Advantages claimed are:

(1) Injury to the facial nerve is immediately noticed.

(2) There is practically no after-effect.

(3) The operation can be performed when general anesthesia is contraindicated.

Simpson reports a case of mastoiditis in which there were few physical signs and symptoms and few abnormal findings in the ear, although the mastoid bone itself revealed extensive pathologic changes. The drum and hearing were normal.

Smith discusses the subject of streptococcus mucosus capsulatus infection in the mastoid and from a study of twenty cases offers the following conclusions:

1. This infection rarely occurs under 20 years of age.
2. A high percentage of the patients have diabetes.
3. The symptoms are very apt to be masked, even in the presence of an extensive destruction in the mastoid process.
4. One of the chief dangers is that of not recognizing the presence of this infection.
5. Practically all of the cases come to operation.
6. Prompt recognition with early and careful surgical intervention will result in a uniformly low mortality.

Smurthwaite emphasizes the physical handicap under which a man labors who is troubled with a chronic discharge from the ear and makes a plea for its prevention by instituting early and efficient treatment of the acute and subacute infections.

Stickney reports two cases of abducens paralysis occurring in acute suppurative otitis media with mastoiditis. In the first case, which cleared up in two weeks following the mastoid operation, the paralysis was regarded as probably being due to a toxic neuritis, as the dura over the tegmen of the mastoid appeared normal. The author regards the paralysis in the second case as due to a localized basillar pachymeningitis, as the dura in the region of the roof of the mastoid and middle ear was thickened, reddened and adherent and showed an exudate in the region of the tegmen tympani.

As to the treatment aside from the mastoid operation and exposure of the dura, the author advocates KI and fluid extract of jalorandi; of the latter gtts x to xx t. i. d. to aid the iodids. Or pilocarpin hydrochlorate, one-eighth to one-half gr, hypodermatically daily or every other day for the same purpose.

After the diplopia has disappeared strychnin sulphate, gr. 1/100 to 1/40 before meals as a tonic to nerve and muscle.

The interrupted current of electricity, used once daily for ten minutes, may be of service.

Mechanical methods to be employed are:

(1) A patch to cover the affected eye.

(2) If the function of the paretic external rectus muscle does not return in one year, the advancement or shortening of the muscle is advisable in order to lessen the field of the diplopia.

VI.—INTRACRANIAL COMPLICATIONS.

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54. De Caradenc. St. Julien R.—Report of a Case of Septic Sinus Thrombosis Without Involvement of the Mastoid. J. Am. M. Ass., Chicago, 1919—LXXII—1288.

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60. Guttmann, J.—Report of a Case of an Otitic Abscess of the Brain. Laryngoscope, St. Louis, 1919—XXIX—581.

61. Hill, Fred'k T.—Report of a Case of Spontaneous Hemorrhage from the Lateral Sinus Occurring Six Days After Simple Mastoid Operation. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919—XXVIII—29.

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63. Keeler, J. C.—Symptom Complex Complicating Acute Mastoiditis with Scarlet Fever. N. York M. J., 1919—CIX—944.

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65. Kopetzky, S. J.—Recently Observed Intracranial Infections Complicating Mastoiditis. Laryngoscope, St. Louis, 1919—XXIX—679.

66. McCaw, James F.—Gangrene of the Temporosphenoidal Lobe, Right Side, of Otitic Origin. Operation and Extensive Incision of the Lobe. With Recovery. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919—XXVIII—823.

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68. Robinson, J. A.—Report and Clinical Notes of a Case of Toxic Delirium Following Mastoidectomy. Ann. Otol., Rhinol and Laryngol., St. Louis, 1919—XXVIII—86.

69. Smith, J. Morrisette.—Two Cases of Skull Fracture with Secondary Mastoiditis and Meningitis, and in One Case Brain Abscess. J. Am. M. Ass., Chicago, 1919—LXXII—995; Laryngoscope, St. Louis, 1919—XXIX—552.

70.—Stickney, O. D.—Case of Bilateral Acute Suppurative Otitis Media with Symptoms of Thrombosis. Laryngoscope, St. Louis, 1919—XXIX—90.

71. Tanaka, H.—A Case of Chronic Purulent Otitis Media Complicated by Thrombosis and Suppuration of the Transverse Sinus, Extradural Abscess and Cerebellar Abscess. Operation and Recovery. Laryngoscope, St. Louis, 1919—XXIX—491.

Blackwell reports a case of temporosphenoidal abscess of the right lobe following a chronic suppurative otitis media. The interesting features brought out are:

1. In abscesses of the right temporosphenoidal lobe, occurring in right handed individuals, there is an absence of any focal symptoms, save those produced by pressure.

2. In the differential diagnosis between this condition and apoplexy, the following points are emphasized: (a) that the slow pulse of an apoplectic patient is usually increased immediately after any exertion, such as rolling over or sitting up in bed, whereas it is the reverse in brain abscess; (b) the headache of brain abscess is quite characteristic owing to unusual severity and paroxysmal nature; the headache of an apoplectic being full and steady in comparison.

3. The patient did not develop postoperative hernia due probably to (a) the comparatively small area of dura exposed; (b) no encephaloscope used, and (c) no counter openings made into the brain for drainage.

Blackwell reports two cases of perisinus abscess and one case of epidural abscess complicating influenza, from which the following observations are offered:

1. The evidences of marked local destruction in mastoiditis due to the presence of streptococcus is a significant feature of the otitic complications of influenza.

2. In considering these cases, the latent manner of development (in two there was no earache at the time of the initial middle ear infection) suggests the possibility of the presence of an unsuspected perisinus or epidural abscess in other postinfluenza patients with aural disease. The importance of otologic examination is clearly indicated by the histories of these patents, not only when earache is present, but in all cases of subjective aural disturbances accompanying and following influenza and pneumonia.

3. Finally, when operating on these patients, the writer emphasizes the importance of leaving undisturbed protective granulations overlying the sinus or brain. All macroscopic evidences of diseased bony mastoid structure should be removed. In addition to the usual technic of the simple mastoid operation, he believes in gentle curettement of the epitympanum without, of course, disturbing or dislocating the ossicular chain.

Bowers reports a case of brain abscess in a patient who had been operated for mastoid abscess by two other physicians, the first operation two months previously and the second operation one month previously. In spite of the fact that the patient complained of headache, temperature 100.3 and inability to flex the foot of the opposite side, the patient was permitted to be up and about, and was promised that the ear would be well in one week. Bowers advised reoperation, which was done and the dura exposed, but as it appeared healthy it was not incised, especially as there were no localizing symptoms of brain abscess. The first two days following the operation the patient's temperature remained at 102, then for a few days it was 101, then dropped to normal. He still complained of headache, and after the third or fourth day he began to be stupid. On the ninth day after the operation he first showed signs of amnesic aphasia, when a large temporal decompression operation was performed and the brain explored. After passing the director directly inward and upward one and a half inches the abscess was reached. At the end of two months the patient was apparently normal.

de Caradenc reports a case of septic sinus thrombosis without involvement of the mastoid.

Three weeks after the onset of a bilateral acute suppurative otitis media, following influenza and measles, and after the suppurative otitis media had been cured as evidenced by cessation of discharge and resolution of the drums with return of the light reflex, the patient presented symptoms of sinus thrombosis—chills, fever, sweats, leucocytosis, blood culture positive for streptococcus hemolyticus—but without any tenderness or pain in mastoids and no evidence of trouble in the tympanic cavity. Other diseases having been ruled out, a mastoid operation was performed on the left side, the cells and antrum found normal, but when the sinus was opened free pus escaped and the culture revealed streptococcus hemolyticus. Patient recovered.

Cumston gives an interesting exposé of the views and teachings of the French school covering the pathology and clinical forms of cerebral abscess of otogenous origin. Pathologically the lesion may be single or multiple, the site being most frequently in the temporosphenoidal lobe. These abscesses are more apt to be encysted, the pus being walled off by a zone of interstitial encephalitis, which forms the socalled capsule. This capsule is thicker in the older abscesses than in those of more recent origin.

Histologically, there are three zones described, going from the center to the periphery:

(1) A zone of necrosis formed by the abscess per se.

(2) A zone of encystment which is one of defense limiting the infectious process.

(3) A zone of irritation of the peripheral structures.

The pus is sometimes a blood stained serum, but more apt to be thick, greenish in color, and with a very offensive odor, depending upon the nature of the bacterial flora. These are, in order of frequency, the streptococcus, staphylococcus and diplococcus. The latter favors the formation of a capsule.

In the majority of cases, lesions in the neighborhood consist of compression and the forcing back of the surrounding cerebral substance. There is no necrosis or direct involvement of the nervous tissue, but simply a deformation. The evolution of these abscesses can be conveniently divided into four types: (a) the first of which, infrequent, is absorption, (b) the abscess may open into the ventricles, (c) the abscess may open into the arachnoid space, (d) a progressively increasing compression from increase in the purulent contents results in a fatal issue from interference with the cerebral functions.

Concerning the clinical forms, six types are described:

1. The first and classic type is that where a patient with chronic otorrhea is suddenly taken with chills and a temperature attaining about 104, accompanied by headache and backache. There will be found a slight stiffness of the neck, occasionally Kernig's sign will be present, as well as vasomotor disturbances. Pulse and respiration normal. After a few days things return to normal. Temperature falls but the headache persists. The appetite returns but the patient becomes emaciated. Then suddenly the patient dies.

2. The typhoid form has a slow development. There is prostration, continued headache, occasionally epistaxis, with a temperature ranging around 104 degrees. Sometimes there is a mild delirium or slight aphasia. Death results.

3. The meningeal form presents the picture of meningitis as the dominating factor. The temperature is irregular.

4. The latent form presents no early phenomena of an infectious process. There are no marked motor or sensitive disturbances and a slight headache is the only complaint. Death occurs suddenly.

5. The remittent form is characterized by a less silent early phase. The patient complains of general fatigue, intellectual fatigue, headache and slight elevation of temperature. These phenomena then disappear until finally an epileptiform attack occurs and death ensues.

6. The last form is that in which the process assumes the picture of a brain tumor; slow pulse, headache, vertigo, vomiting and apyrexia.

Eagleton describes an original device for the control of hemorrhage from the large sinuses of the brain by invulsion of the outer wall into the lumen, and reports a successful operation for cerebellar abscess by obliteration of the lateral sinus and exploration and drainage through its inner wall and anterior surface of the cerebellum.

A small opening is made in the dura on each side of the sinus and a ligature is passed from one dural opening to the other. The appliance holds the two ends of the suture apart so as not to compress the fixed dural attachments, while the descent of a metal obturator causes an invulsion of the outer wall of the sinus into its cavity, obliterating its lumen.

Eagleton has analyzed all the recorded postmortem reports of patients dying from cerebellar abscess, and while in a general way these reports justify the statement that the position of the abscess in or on the cerebellum is influenced by the route of the extension of the infection into the cerebellum, nevertheless no relation uniformly exists between the point of infection and the situation of the abscess that can be utilized surgically. Consequently to meet the surgical requirement that the operative procedure will uniformly locate the abscess or allow of its complete evacuation and the introduction of drainage material within the abscess itself, the author states that in all cases it is necessary:

1. To obliterate and doubly ligate the descending portion of the lateral sinus. This may be done by invulsing the external wall into its cavity.
2. To expose the dura of the whole cerebellar fossa of the affected side; and as the affected hemisphere occupies a position beyond the median line, the bone over the unaffected hemisphere should be freely removed.
3. To perform a ventricular puncture in order to relieve the internal hydrocephalus.
4. Then to incise the dura as far forward as possible, the incision, extending outward through the obliterated sinus and continued in whatever direction necessary.

Friesner reports a case of cerebellar abscess following an acute mastoiditis.

On the fifth day patient vomited and became stuporous, temperature 99°, pulse 40. He had involuntary stool and urination. Lumbar puncture was made but fluid was not under tension and appeared clear. It contained a few pus cells but no bacteria. Patient slowly became generally rigid, followed in twenty or thirty minutes by complete relaxation. Middle fossa was exposed, but appeared normal. On exploring cerebellum to a depth of three centimeters an ounce and a half of thick, yellow, nonodorous pus was evacuated. Patient stopped breathing and could not be resuscitated.

The interesting features were the degree and extent to which destructive lesions took place about the vital centers in the posterior fossa with no symptoms.

Good discusses extradural irritation and abscess, and makes a plea for early exposure in order to prevent those serious and fatal complications, such as brain abscess, meningitis and sinus thrombosis.

The symptoms depend upon (1) the amount of pain the patient can endure from the mechanical irritation of the sensitive dura;

(2) the severity of the infection and the extent of the edema of the dura; and (3) the degree of intracranial pressure. The symptoms of mechanical noninfective irritations, of the acute infective type, and the chronic infective type are then described in detail.

Guttmann reports a case of otitis abscess of the brain, of which the following are the interesting features:

1. At the onset of the disease the patient was treated for gastritis, the vomiting and headache being attributed to disease of the stomach. This in spite of the fact tha the patient had an ear discharge for 16 years.

2. Granulaions in the middle ear evidently not attached to the labyrinthine wall, were removed, and four days later temperature rose to 103, and there was severe headache and drowsiness. The lesson from this occurrence is that the removal of polyps from the ear, even when they are not attached to the labyrinthine capsule, may flare up a slumbering meningitis.

3. The radical operation was at once performed and foul smelling cholesteatomatous masses were found filling tympanic cavity and antrum; the tegmen antri seemed perforated with drops of pus oozing through the opening, which was widened, and two ounces of very offensive smelling pus gushed out. There was some improvement, but five days later the wound was reopened, and the dura found bulging. Brain was explored and two ounces of pus evacuated. Breathing suddenly stopped due to temporary interference with the circulation in the medulla. Artificial respiration reestablished breathing, but in six hours patient died.

4. The course of the affection was probably the following: Cholesteatomatous masses broke through the tegmen tympani or antri, forming a chronic brain abscess. This was quiescent, and having produced no symptoms the patient did not seek relief until the abscess caused meningeal irritation.

Hill reports a case of spontaneous hemorrhage from the lateral sinus occurring six days after a simple mastoid operation. At the operation there was disclosed a perisinus abscess, but the granulations were not disturbed. Four days after the operation there occurred a chill, with rise of temperature to 104. Two days later the first spontaneous hemorrhage occurred, due to necrosis of the vessel wall, and two days later there occurred the second chill. Ligation was then performed, but not until there was present a septicemia manifested by subsequent septic temperature and a metastatic process in the right shoulder. The attempt to demonstrate the thrombus was unsuccessful. Because of the necrosis of the sinus wall, manifested by subsequent hemorrhage, it was impossible to block off the sinus above or below, to remove a part of the lateral wall and obliterate it by compression. This resulted in a retention of the focus of infection within the vessel. Further necrosis of the wall took place, together with breaking down of the clot and subsequent hemorrhages ensued.

Hill thinks that this case bears out the generally accepted opinion that thrombosis of the lateral sinus is due to necrosis of the intima of the vessel wall, which may be manifested by hemorrhage from the sinus, and that therefore a hemorrhage is sufficient indication to operate on the sinus rather than wait for the clinical two chills and septic rise of temperature.

Kahn has devised a brain abscess drain, which is an instrument made according to the obturator canula principle. The canula or drain is made of metal and has a round, smoothly screwed surface —the train is mounted on a leader or opturator—the leader being round and blunt at one end and having a thumbscrew at the other end. When the brain abscess is located, the canula, mounted on a rod, is screwed into the abscess cavity; the leader is now withdrawn, leaving the canula. The abscess cavity can now be packed with gauze through the canula opening. As the cavity heals, the canula can be unscrewed a little at each dressing, until it is finally withdrawn.

Keeler reports a rather virulent attack of acute mastoiditis following scarlet fever, with extension of the infection to labyrinth, cerebellum and meninges. The intracranial complications became manifest about three days after the simple mastoid operation. Opening the labyrinth and draining the pus from the cerebellum brought about a cure.

Kerrison reports a fatal intracranial infection which was diagnosed only after death. The autopsy revealed a sinus clot apparently of rather recent formation, extending from near the torcular to a point near the jugular bulb. Free pus was found between the dura and right lobe of the cerebellum, which also showed well marked cortical changes, apparently of longer duration than the sinus clot. The presence of a complicating erysipelas obscured the clinical picture so that a brain operation was not indicated by the symptoms present, unless it would have been the bradycardia which was present. However, this cleared up at the cessation of the erysipelatous attack.

Kopetzky discusses some intracranial infections complicating mastoiditis which presented symptoms unusual in character and open to differing interpretations by well qualified surgeons and neurologists. There are four cases of sinus thrombosis reported; also one case each of cerebellar abscess and of meningitis sympathica.

Of the cases of sinus thrombosis two were in children, the youngest thirteen months of age; and of these one was tentatively diagnosed as pneumonia, and the other as presenting a temperature caused by absorption. This case was treated expectantly until a beginning rigidity of the neck warned of the advent of serious meningeal involvement; and the examination of the cerebrospinal fluid just prior to operation revealed that there was a meningitis already purulent in character. One of the adult cases presented a sinus thrombosis so extensive as to prove inoperable, and this developed, even though he was under competent observation during the entire period of his illness. He was never sick enough to be in bed until seen the day prior to operation, and even then it needed considerable urging to convince him to submit himself to operation. The fourth case was one which did not present any symptoms referable to sinus thrombosis. He did present an almost classic picture of cerebral abscess, and his case was thus diagnosed by competent neurologists.

The case of cerebellar abscess presented itself with no characteristic signs until the terminal stage of the patient's illness. He had a negligible middle ear picture and a tentative diagnosis of encephalitis lethargica had been made. When the clinical manifestations as they finally were evolved were considered in connection with the few drams of pus evacuated from the cerebellum, one could hardly comprehend them as factors constituting cause and effect. The remaining case was one of chronic mastoiditis, presenting itself during a stage of subacute exacerbation. In this case otoscopic examination failed to reveal any evidence of the finding of a large cholesteatoma involving the middle ear and mastoid process. The patient had had competent otologic supervision prior to coming under the author's supervision. A few hours after operation the patient developed signs of a rapidly increasing intracranial pressure, and his vital centers in the medulla were evidencing increasing difficulty in functioning. Prompt recognition of the condition and equally prompt decompression operation—at which nothing more than an edematous condition of the meninges and brain tissue was found—probably saved his life. The clinical picture of a man, in violent mania, confined in a straightjacket, with Cheyne-Stokes respiration deevloping a few hours after radical mastoidectomy, remains as yet unexplained. Striking indeed was the prompt remission of all these symptoms upon decompression.

A detailed report of the cases with comment is added.

McCaw reports a case of gangrene of the temporosphenoidal lobe complicating a chronic suppurative otitis media. The otitis media had been of twenty years' duration with acute exacerbation. During one of these exacerbations, operation was performed and the dura appeared greenish and gangrenous. Incision of dura revealed similar condition of brain, so with forceps and scissors the greater portion of the temporosphenoidal lobe was cut away. It was of the consistency of soap and of a greenish, gangrenous condition throughout. There was no bleeding. Normal brain tissue was not entered. The excavated cavity in the brain was three inches inward and three and a half inches forward from the surface of the wound. Patient made an uneventful recovery and his mental and moral status was greatly improved. From a mental and moral pervert he was restored to the community as a reliable and fairly good citizen.

There was a small cerebral hernia about one-half inch in all diameters, for which the following plastic procedure was done two months after the original operation. The flaps were elevated thoroughly and the entire wound lightly curetted. A flap was fashioned from the posterior flap of the mastoid wound, including the periosteum and overlying tissues except the skin, cut free at its lower part, carried upward and forward and sutured to the periosteum at the upper and anterior part of the wound. This flap acted as a suspensory and covering to the hernia, giving it support. Another flap was made from the posterior auditory canal so as to enlarge the meatus, and this was carried upward and backward, being sutured to the upper part of the posterior wound flap, thus giving further support to the hernia.

McKinney reports a case of suppurative otitis media for which a mastoidectomy was done. Subsequently there developed metastatic abscesses on the shoulder and at the end of the spine, as well as rigors and a temperature course that were typical of sinus thrombosis. Evidence of any other kind was lacking. Twelve days after the mastoidecotmy it was decided to explore the sinus. The sinus wall was thickened and grayish, but a slight pulsation was noticeable. Because of his weakened circulation, nothing more was done and patient returned to his room. Immediately following this exposure, and temperature dropped and ran an almost flat course from that time on, and the patient made an uneventful recovery. The question asked by the author is: What bearing did the removal of the overlying bone have on the recovery by crisis, or was this merely coincidental?

Robinson reports a case of toxic delirium following mastoidectomy. The trouble started two days after the operation and was still present six weeks later. At first the patient was slightly irrational but later developed delusions of persecution, at one time attempting to throw herself out of the window.

In studying the history of this case, the following facts were brought out:

1. The patient had always been recognized as a highly nervous woman and was within a few years of the menopause, and therefore more likely to be stimulated by toxemia of any nature.
2. The delirium developed early in the course of her convalescence.
3. The gouge was not employed except for the removal of the cortex, which was not unduly hard.

Robinson views the case as one due to absorption products from the mastoid, especially as the patient had been in urgent need of operation for two weeks. The operation, the fear of the procedure, the duration, the discomfort of the drainage and the postoperative treatment are all etiologic factors acting upon a nervous patient.

In order to lessen the chances of this complication the following measures are advocated:

1. Early operation, if pain is not relieved by prompt myringotomy and appropriate treatment.
2. A minimum use of gouge and mallet.
3. The use of nitrous oxid in doing the first dressing on a highly nervous patient, and subsequent dressings to be made as painless as possible.
4. A constant surveillance should be maintained over a patient who manifests early nervous derangement, so as to prevent bodily harm.
5. Free patient from all sources of irritation, have diet nourishing and attend to elimination.

Smith reports two cases of skull fracture with secondary mastoiditis and meningitis, and in one case brain abscess.

In the first case the mastoid cells were thoroughly exenterated, the patient dying two days later with meningitis.

In the second case the mastoid cells were not exenterated, only the cortex was removed, avoiding the use of hammer and chisel. This patient made a temporary recovery, going home and being apparently well for three months, when symptoms of brain abscess appeared. Pus was evacuated from the frontoparietal region, and in three weeks death occurred from meningitis.

From this experience the author advises against complete exenteration of the mastoid cells so as not to interfere with the protecting wall of granulations along the line of fracture.

Stickney reports a very interesting case of bilateral acute suppurative otitis media with symptoms of sinus thrombosis. A bilateral simple mastoid operation was performed and sinuses exposed but no thrombus suspected. After operation patient had chills, remittent temperature, swelling of right elbow from which pus was obtained and the streptococcus isolated, this being the same organism as was recovered from the mastoid. The blood examination seemed conflicting, because while the blood picture improved, the patient became worse. Finally both sinuses were incised, and though there was bleeding from the right, it was not as free as normal, hence the internal jugular vein was ligated and a portion resected. The left sinus was explored and free bleeding occurring from both ends, the vein was not disturbed but the pressure to stop the flaw of blood produced the same effect as a bilateral ligation of the internal juguiar vein. In spite of this, the patient exhibited no evidences of increased intracranial pressure. Eyegrounds remained normal and patient made a good recovery.

Tanaka reports a case of chronic purulent otitis media in a girl 14 years of age, which was complicated by thrombosis and suppuration of the transverse sinus, extradural abscess and cerebellar abscess. Several operations were performed in an attempt to eradicate the suppurative focus in the brain, and finally, after all hopes and the patient had been given up, the focus was discovered and the patient recovered. The course of the disease is presented by daily notes for which the original article will have to be consulted.

VII.—DISEASES OF THE INTERNAL EAR.

72. Goeckermann, W. H., Barlow, R. A., and Stokes, J. H.—The Diagnostic Value of Lowered Bone Conduction in Syphilis. Am. J. Syphilis, 1919—III—240.

73. Hoshino, T., and Shimasaki, S.—Impaired Hearing Following a Paralysis of the Nervus Abducens. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919—XXVIII—489.

Goeckerman, Barlow and Stokes present the following conclusions relative to the diagnostic value of lowered bone conduction in syphilis:

1. The socalled lowered bone conduction test (reduction in conduction of sound by bone as compared with otherwise normal hearing) is positive in 78 per cent of known syphilitics in our series.

2. From the otologic standpoint the test is only of value if a complete hearing test is done.

3. The efficiency of the test varied greatly in different types of syphilis, being at its best in late cutaneous syphilis (100 per cent), latent syphilis (80 per cent), syphilis of the central nervous system (80 per cent). It had almost no value in osseus lues, and the results in early syphilis were inconclusive (too few cases). A neg-

ative Wassermann test combined with a negative bone conduction test is strong evidence of the absence of syphilis.

4. The test agrees with the positive or negative diagnosis of syphilis in 67 per cent and disagrees in 33 per cent.

5. The test was also positive in 48.7 per cent of patients in whom syphilis could apparently be excluded.

6. It has, on the whole, therefore, only a restricted value as a diagnostic aid, owing to its high factor of error.

Hoshino and Shimasaki report a case of impaired hearing and tinnitus followed in the course of paralysis of the abducens nerve, in which there was no apparent focal infection or any disease of the middle ear and its related structures.

The salient features as summarized by the authors are:

1. The subject had hearing disturbances of high pitched sounds, tinitus of high character, and hyperesthesia in the region of distribution of the trigeminal nerve, in the course of an abducens paralysis, all occurring on the same side, and in a little less time than two weeks.

2. Accurate examinations of the middle ear and its related structures and the internal ear showed normal condition.

3. All symptoms from the abducens, trigeminal and cochlear nerves must have been caused by the syphilitic affection.

4. The localization of the lesion in this case may be supposed to be in the meninges behind the petrous portion of the temporal bone, and involving those portions which are pierced by these three nerves.

VIII.—INJURIES.

74. Cutler, F. E.—Injuries of Auditory Canal Resulting from Projectiles. Laryngoscope, St. Louis, 1919—XXIX—82.

75. Neuhof, H., and Cocks, G. H.—Remarks Upon the Treatment of Gunshot Wounds of the Mastoid. Laryngoscope, St. Louis, 1919—XXIX—615.

Cutler presents an instructive contribution to the subject of injuries of the auditory canal resulting from projectiles, with special reference to the separation of the cartilaginous from the bony canal.

The author roughly classifies injuries of this character as follows:

1. Injuries to the cartilaginous membranous canal.
2. Injuries to the bony canal.
3. Injuries to the cartilaginous membranous and bony canal.
4. Separation of the cartilaginous membranous from the bony canal.

The smooth penetrating bullet wound which injures the cartilaginous membranous canal at its external beginning, heals frequently without undue symptoms and without stenosis of the canal. The deeper smooth penetrating bullet wounds, the nearer they are to the bony meatus, the more apt they are to form stenosis or atresia.

The wounds of the cartilaginous canal are nearly always accompanied by splinter fractures. The result of these injuries after the splinter comes away, in the course of a prolonged suppurative process, can in nearly every case be prognosed as a greater or lesser stenosis. The more severe and larger lesions of the bony and cartilaginous canal occur only with greater injuries in the immediate neighborhood from shrapnel or shell. Injury of the temporomaxillary joint and facial nerve frequently occurs in connection with this injury, as well as injury to deeper structures of the ear.

The type of injury in which the cartilaginous membranous canal is separated from the bony canal is produced by the bullet dissecting the cartilaginous from the bony wall on the under surface.

In these cases one finds on the border between the cartilaginous and the bony wall a typical semilunar granulating ridge, springing from the floor and anterior wall and projecting prominently into the lumen of the canal. The result of these injuries in the absence of treatment is usually a greater or lesser stenosis and at times even a complete atresia. In recent cases skillful tamponage is indicated. In old cases already stenosed, laminaria tents are used. For complete atresia operation is indicated. If complicated with a discharge from the middle ear a plastic operation with complete removal of the posterior bony canal wall is recommended. In case of atresia of the cartilaginous membranous canal alone, several methods have been attempted:

1. Excision of the scar with Thiersch skin graft.

2. Crucial incision through the scarry septum, forming four triangular flaps which are inverted and pushed inward.

3. Excision of the scar tissue and covering the denuded area with skin flaps from the vicinity.

4. The method successfully employed by Ruttin. This consists in cutting through the external ear at its basilar attachment and removing the scar tissue which caused the atresia, taking a skin flap from the mastoid process and drawing it through the incision, placing it with a thin spatula, so that it forms the posterior wall of the meatus. The granulations of the other walls are held in check with tamponage.

The author gives one case report out of the many which he had the opportunity of observing.

Neuhoff and Cocks discuss the treatment of gunshot wounds of the mastoid and state that the method of treatment depends upon whether the patient is operated early, before the onset of wound contamination or definite infection, or whether he is first seen after the wound is suppurating.

1. Operation in the first state, before wound infection, embraces

(a) Excision of the wound.

(b) Removal of in-driven bone fragments and foreign bodies, and damaged portions of the mastoid.

(c) Closure of the dural tear by suture or by fascial transplant.

(d) Primary closure of the wound.

The complication of laceration of the lateral sinus is treated by "postage-stamp" graft or ligation of the sinus, depending upon its extent. Larger lacerations of the sinus are treated by double ligation.

2. Treatment at the base after wound infection, includes

(a) X-ray for additional foreign bodies.

(b) Incision and drainage of the bone wound, with complete exenteration of the mastoid cells.

(c) Employment of Carrel-Dakin technic.

IX.—EDUCATION OF THE DEAF.

76. Goldstein, M. A.—Present Status of the Teaching of the Deaf. Laryngoscope, St. Louis, 1919—XXIX—503.

77. Kessler, Emma B.—The Aurist and Lip Reading. Laryngoscope, 1919—XXIX—163.

78. Richardson, Chas. W.—Organization of the Section of Defects of Hearing and Speech. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919—XXVIII—421.

Goldstein in discussing the present status of the teaching of the deaf draws attention to the influence which properly educated teachers have in promoting pure oralism and makes a plea for cooperation of all interested in this work in order to secure enactment of laws for protection and education of those with defective hearing and defective speech.

Kessler deplores the fact that many incurably deaf patients are not told of the benefits of lip reading and urged to take up this study, especially while a small amount of hearing is still present.

It is a great indictment of the aurist to be informed that "from among fifteen persons who are more or less deaf, and who have recently become enthusiastic lip readers, only three had heard of speech reading through their aurists."

Richardson discusses in considerable detail the plan of organization of the section of defects of hearing and speech of the division of physical reconstruction, and adds a summary of all cases treated up to May 31, 1919.

X.—MISCELLANEOUS TOPICS.

79. Amberg, Emil.—Treatment of Ear Diseases in the Light of Medical History. J. Michigan M. S., Detroit, 1919—XVIII—521.

80. Blackwell, H. B.—Diagnosis of Earache. N. York M. J., 1919—CIX—1076.

81. Burns, Stanley S.—Some Unusual Cases Met With in Ear, Nose and Throat Service in a Base Hospital. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919—XXVIII—73.

82. Dean, L. W.—Report of a Case of Suppurative Labyrinthitis and Tuberculoma of the Cerebellopontine Angle, Cerebellar Abscess, With Miliary Tuberculosis of the Lungs, Spleen, Kidneys and Intestines. Ann. Otol., Rhinol. and Laryngol., St. Louis, 1919—XXVIII—514.

83. Dean, L. W., and Armstrong, Margaret.—A Case of Fibrosis of Tissues Lining the External Auditory Canal and Tissues Overlying the Mastoid. Laryngoscope, St. Louis, 1919—XXIX—365.

84. Graham, H. B.—Frequent but Neglected Evidences of Syphilis From the Side of the Nose, Throat and Ear. Am. J. Syph., 1919—III—26.

85. Leiner, J. H.—Etiologic Factors Bearing on Therapeutics of Bell's Facial Palsy. Med. Rec., N. Y., 1919—XCV—319.

Amberg discusses the treatment of ear diseases in the light of medical history and comes to the conclusion that our progress has not been as great as we are wont to believe and that much of the present day knowledge was possessed by the ancients.

Blackwell presents a concise classification of the various conditions producing earache, and discusses some of the different points so that the general practitioner may be aided in making a prompt and proper diagnosis. Four types are presented:

1. Earache due to an inflammation behind the tympanic membrane.

2. Earache due to an inflammation in the soft parts of the external auditory canal.

3. Earache due to an inflammation, but produced reflexly from teeth, nose or throat.

4. Earache largely mechanical in origin, occurring chiefly in infants and at night. The prone position increases congestion of the nasopharynx; the eustachian tube is closed; a vacuum is produced in the middle ear; child cries from pain; tube opens; relief occurs.

Burns reports a case of dermoid cyst behind the auricular attachment of the left ear which was discharging. Two previous operations gave no relief. The sinus was injected with methylene blue solution and upon distention was found to be connected with a cavity one centimeter in diameter, which was directly posterior to the external auditory canal wall. Under cocain anesthesia the sinus was followed up and sac removed. Examination of the interior of the sac revealed small downlike hairs and several small cartilaginous bodies. No symptoms of recurrence after two months.

Dean presents a detailed case report of a suppurative labyrinthitis and tuberculoma of the cerebellopontine angle and cerebellar abscess, in which the symptomatology was in accordance with the accepted conceptions of labyrinthine and cerebellar symptoms, except in one thing: With a labyrinthine nystagmus to the left and a cerebellar right sided lesion, the patient was always most comfortable lying on the right side.

In closing, the author advises that in intracranial lesions with chronic paranasal sinus disease or chronic mastoiditis, we should always keep in mind the possibility of a tuberculous bone lesion and tuberculosis of the brain.

The postmortem in this case revealed tuberculous meningitis.

Dean and Armstrong report an interesting and unusual case of fibrosis of tissues lining the external auditory canal and of tissues overlying the mastoid. The ear projected almost at right angles to the head with a swelling over the mastoid which, however, felt like a polyp. Operation revealed a large mass of fibrous tissue which was partially removed. A few months later the deformity recurred, so that another operation was performed, at which time the fibrous tissue was extensively and completely removed. All of this trouble was dated to ten years previously, when the ear was pulled, giving the feeling that it was being torn from the head.

Graham in discussing the frequent but neglected evidences of syphilis of the ear, does not mention the common well known diagnostic features, such as the ulcerations and necroses due to the thromboses of the veins on account of the pressure of the small round cells, but on the contrary he draws attention to symptoms often overlooked, due to the deposit of small round cells per se.

As to the character of the discharge from the middle ear, a thick ropy discharge without pain is significant.

Cochlear symptoms suggestive of syphilis are:

1. Shortened bone conduction.
2. Probable lateralization.
3. Rinné positive, in the presence of impaired hearing.
4. Islands of hearing demonstrable.
5. Tinnitus.

Vestibular symptoms suggestive of syphilis are:

1. Progressive reduction of the nystagmus time (below 26 seconds) after turning, or reduction remaining constant in the presence of other evidence of syphilis.
2. Absence of a turning reaction with a caloric reaction present or vice versa.
3. Irregularities in the reactions between the vertical and horizontal canals.
4. Vertigo present without nystagmus or exaggerated after turning, or caloric nystagmus without vertigo.

The main characteristic in all is the disharmony existing between them.

Leiner discusses the etiologic factors bearing on the therapeutics of Bell's facial palsy. The following points are emphasized:

1. Bell's facial palsy occurs more frequently on the right side.
2. It occurs twice as frequently in the female as in the male.
3. It is more frequently present between April and September.
4. The primary etiologic cause is exposure.
5. Counter irritation should be the earliest, and it also is the best remedy, if the case is a primary facial palsy.
6. All electricity should be immediately stopped when the first symptoms of contracture appear.
7. Electricity (galvanism) is the only treatment in chronic cases, and should be employed even up to a year after the onset of the paralysis, providing there is no tonic contracture of the musculature.

SOCIETY PROCEEDINGS.

NEW YORK OTOLOGICAL SOCIETY.

Annual Meeting, November 25, 1919.

PRESIDENT DR. T. J. HARRIS.

Dislocation of the Stapes in the Radical Mastoid Operation.

Dr. J. D. Richards: I have recently had a case of accidental dislocation of the stapes which I would like to report, simply to emphasize its dangers. It occurred during an ordinary radical operation. I think I was somewhat to blame for it, in that the facial ridge had been lowered very near to its limit before the tympanic cavity was cleared out. This exposed the stapes to injury by sponging. Following the operation, there was noticeable nystagmus, but there was no immediate rise of temperature. There occurred later, after a period of about three days, headache which was very severe; the nystagmus gradually subsided. Deafness had become practically absolute, but at the end of about fourteen days, patient complained of very severe headache. A spinal puncture was made, the result showing a pure streptococcus infection of the fluid. I operated immediately—that is, two weeks after the original radical operation and the date of the accidental stapes dislocation, upon opening the modiolus there was an escape of actual fluid pus through the internal auditory meatus. The intracranial cavity in this instance was drained through the internal auditory meatus. I have seen a number of these cases now, and many of them run no temperature subsequent to the accident until symptoms of meningitis ensue. We are liable to let those cases go without draining the labyrinth immediately in the hope that intracranial infection will follow. I have now come to the conclusion that it is safer in accidental stapes dislocation during the radical operation, without waiting for symptoms to develop, to open the vestibule, that is to remove the outer vestibular wall at the time that the accident occurs. The promontory corresponding to the first cochleal whorl should be removed also.

I would like to get an expression of opinion from other members of the society in regard to their experience with this accident.

I might mention that the stapes was dislocated in this case by the assistant sponging too vigorously over the site of the stapes. As the facial ridge had been lowered to its absolute limit before the tympanum had been cleared out, it can be readily understood that this accident was more likely to occur than if the ridge had not been lowered to such a degree until later in the operation.

Dr. Kerrison: The whole literature bearing on Dr. Richards' deductions supports the view he has expressed—i. e., that a surgical accident to the stapes during a suppurative lesion is one of the most dangerous that can occur.

We all remember, I suppose, that Dr. Jack of Boston many years ago reported quite a series of cases in which he removed the stapes in nonsuppurative lesions for the improvement of hearing; and while this procedure has not appealed to otologists as a rational one, his results did seem to prove that removal of the stapes is not particularly dangerous so long as strict asepsis can be maintained. But removal of the stapes, or rupture of its annular ligament during a suppurative middle ear lesion admits pus or infective matter into a vestibule in which no protective barrier have been set up to guard the meninges; and I agree with Dr. Richards that immediate surgical drainage of the labyrinth is a logical step, and is the best safeguard, though not a perfect one, against invasion of the meninges.

Dr. E. B. Dench: It has always been my practice during a radical operation to explore the oval window very delicately with a fine middle ear probe, because I know that very frequently crura and the head of the stapes will be found wanting, and yet the vestibule closed by the footplate of the stapes. Whenever I can't see the head of the stapes perfectly at the end of my operation, I always take my fine middle ear probe, and simply palpate lightly the region of the oval window. If my probe doesn't enter the vestibule, then I pay no attention to the accident whatever. If the oval window is not open, I never feel any hesitation about using a primary graft. If the oval window is open, naturally, I never graft a case of that kind, but I do pack off, and I have been fortunate enough not to have had the untoward effect that Dr. Richards mentioned.

In one case of that kind, in which I have forgotten whether the stapes come out or not, I found the oval window open. I packed off in the way I described, and eight days later did a secondary grafting operation. That man made a perfect recovery. I had one case where during a myringotomy I think that I hit the stapes and the patient became deaf, but luckily had no other untoward symptom. That was bad enough. It is a mystery to me that this accident does not happen more frequently.

I always warn the assistant in sponging, and point out the stapes to him at a very early stage of the operation; and in certain cases where I have very good hearing, I even pack over the region of the oval window with a small cotton pledget so that the sponge of the operator will not come in contact with the stapes. Considering the number of radical operations that are done, I think there are very few accidents of this kind reported.

Regarding the advisability of doing an immediate labyrinth operation from my own experience I wouldn't advise it. I think it is safe, and yet I don't see why it is very much safer than it is to pack off the oval window as I suggest. I don't see why we should open up, for instance, the first two turns of the cochlea and the semicircular canals, instead of packing off the one area and trying to isolate it.

I think what Dr. Richards says is very true, but I should rather hesitate, however, to take out every labyrinth where the stapes is dislocated. I would like to ask Dr. Richards, at the time of the operation, whether he actually found the oval window open, or whether it was closed.

Dr. Richards: The stapes was dislocated, and seated on the promontory after the sponging was done.

Dr. Dench: Was the window closed?

Dr. Richards: The stapes came out as a whole.

Dr. Dench: At the same time there is usually a thin layer of membrane which occludes the oval window even if the stapes is dislocated.

It takes a good deal of force to dislocate a stapes. I rather think that Dr. Richards is blaming himself a little too much, as far as the result is concerned.

The Chairman: Can you tell me how many times the accident has happened in your practice?

Dr. Dench: The first case I remember very vividly, because I was very much worried about it, and since then I should say that I had seen two or three other cases. Two of those cases made complete recovery, but these are the only two cases I remember where the vestibule was actually open at the time of the operation.

In a great many cases I have seen the crura and the head absent and the oval window closed. In all of Dr. Jack's cases, where the stapes was extracted in nonsuppurative otitis media there was no perilymph flow because the vestibule is normally closed by a thin membrane. I think Sommering the first to point this out.

Dr. Friesner: From my own histologic studies, I never believed that there was any membrane internal to the foot plate. There is a membrane or rather a ligament around the foot plate, but I don't think there is any internal to it, except the endosteum. I am sure from my dead house experience that very frequently in doing a radical mastoid operation the crura of the stapes must be broken and I don't think that it makes any difference.

Dr. Richards omitted one point that, I think, is very important. In teaching men operative surgery, I insist on them learning to sponge in one way, sponging in the middle ear in a radical mastoid. That is, I make them sponge toward the tube, keeping absolutely away from the posterior part of the cavity; and in cleaning out the cavity—for instance, very frequently right after the bridge is broken down, the middle ear is full of granulations, I teach them to put the curette in the region of the tube, and sweep it downward and backward over the cochlea to the floor. That, to my mind, is the only safe way to clean, and the only safe way to sponge the middle ear.

A number of years ago in a very short time I saw three cases in which the stapes was dislocated during a radical mastoid operation. They all developed acute labyrinthitis. One of them developed a suppurative meningitis and died. The other two recovered, of course with total loss of function. I think if such a thing happened to me I would be perfectly willing to take counsel with regard to whether or not to open that labyrinth ond it seems to me I would hesitate at the time of the operation to subject that patient to further operative procedures on the labyrinth. The foot plate of the stapes is practically the entire outer wall of the vestibule and when the stapes is out the vestibule is fairly well open.

I would like to hear from Dr. Richards as to how much more he would do, whether he would simply open into the vestibule through the external canal and quit there or whether he would take off the promontory.

Dr. Page: I had a case similar to this. The child, about eight years old, was brought into the clinic with an apparently acute labyrinthitis. It was staggering and very sick, nauseated. No tests were made at the time, except to note that it had no hearing. Noise apparatus was put in the left ear and no hearing was present in the right. The child couldn't distinguish between a shout and a loud whistle. It was put to bed and kept quiet and developed no complications. At the end of three weeks when he was walking around the ward he was told that his mother could take him home and bring him back for a radical mastoid operation later. The tests, at this time, after his acute symptoms had subsided, showed negative caloric and absolutely no hearing in the right ear. No rotation tests were made. He was brought back, probably six weeks later—I don't know the exact time, but it was at least six weeks after—and it was found that his hearing had returned. He heard a whisper at six inches with a noise apparatus in his other ear, and we found that he had a sluggish but a positive caloric reaction.

Then the radical mastoid was done on him, and a cholesteatoma was found in the antrum and attic and tympanum. When this was removed, the stapes was brought into plain view. I touched the stapes with an attic probe, demonstrating it to some students; when I touched the stapes it fell over and came away intact and left a pit, into which the membrane of the cholesteatoma continued. The upper posterior quadrant of the inner wall of the tympanum was covered with an epithelial layer from the cholesteatoma, from the sheath, or the capsule of that cholesteatoma. It acted as a skin graft and it has been left there, and there was so little tendency for granulations to form that no packing after the first twenty-four hours was put in the cavity. It was washed out with a Dakin's solution every two hours. The niche can still be seen and a closed oval window with this white membrane lying over it. He was not disturbed afterwards, and he has hearing in the ear still.

Dr. McCoy: It seems to me that the reports of these cases of dislocation of the stapes indicate that it may result in either one of two conditions: A serous labyrinthitis, with a resultant complete loss of hearing, or a purulent labyrinthitis. As far as I can recollect, in reading the statistics of the condition, the majority of the cases develop a serous labyrinthitis with simply the loss of hearing, but a certain proportion develop the purulent labyrinthitis.

Now, we have no means of determining, as far as I can tell, just how it is going to turn out, whether it is going to be a purulent labyrinthitis with meningitis or a simple serous labyrinthitis, and until we have some such method, I think it would be better surgery to open the labyrinth and give as full and free drainage as we possibly can get.

Dr. Richards: Whether we propose to merely open the labyrinth in cases of this character or to do an exterior removal of the labyrinth capsule we must remember the fact that the infection confines itself to the fluid; there is no bone involvement. To remove the semicircular canal system is altogether unnecessary; as it has no important connection with the intracranial cavity except by way of the vestibule.

If we propose to open the labyrinth, we should open both the outer vestibular and cochleal wall; we cannot drain the cochlea by draining the vestibule except imperfectly; so the outer wall should be removed also. It is through the cochlea or modiolus that the greatest danger to intracranial infection lies.

The dislocation of the stapes in a pure radical operation for chronic suppuration is, without doubt, a very serious accident; it is a question of life and death; from what I have seen, I would place the mortality at about fifty per cent. Of course, that experience is very limited, but we are confronted with a very grave danger of meningitis.

My own feeling in the matter is this: I consider it the proper thing to do when the stapes is accidentally dislocated during the radical operation for a chronic suppurative ear, to immediately remove the outer vestibule and cochleal wall without waiting for further developments.

Dr. W. H. Haskin: I would like to make one suggestion, which I think is really a very valuable one in doing radical surgical operations, and that is to use suction in keeping the cavity clean, especially when working in the middle ear cavity. Force is unnecessary; also sponging. The cavity can be kept absolutely clean by holding the catheter with the left hand. The whole field can be clearly seen.

Brain Abscess.

Dr. McCoy: The patient who came into my service in the New York Eye, Ear and Throat Infirmary last spring, was sent in from a clinic with a history of chronic suppuration in the ear, of fifteen years' duration. The night of the afternoon that he came in, he seemed to be in a very irritable condition of mind. He got into a fight with several of the patients and finally with the orderly, and insisted on leaving the hospital early the next morning. He was sent in for operation on the next day. We didn't hear anything more from him for three or four days, and he was then brought into the hospital, I might say, carried in in rather a stupid condition. He had a slow pulse, temperature was about 100. We took some of his spinal fluid, which later showed a cell count of about 800, and that afternoon a radical mastoid was performed. We searched for a symptom possibly leading to his brain, but could not find it. He was returned to bed for further observation, and the next day his mentality was quite normal. His pulse remained slow, and he was then tested for focalizing signs, and he had a very typical aphasia of the sensory type; that is, when shown a watch, he knew what it was, but he couldn't tell what it was; when shown a pencil, he knew what it was for, but he couldn't say the word "pencil." His mind was very clear. He would say, "That is very funny, I know what that is, I know perfectly well what that is, but I can't say it."

So we watched him for another couple of days, and finally decided to explore his temporosphenoidal, but without result. He was returned to bed, and gradually his cell count increased. Bacteria appeared in the spinal fluid and about five days after the operation he passed away.

I was particularly interested to see why I had missed locating the pus in his temporosphenoidal lobe. We reopened the wound and explored the brain, and in taking out the brain section by section, we took out the entire temporosphenoidal lobe, with no sign of pus whatever. We cut forward, however, and in taking it out layer by layer, we came upon an abscess about the size of a pigeon's egg, which was lying directly upon the posterior wall of the frontal sinus. It made me think that perhaps this man had a chronic suppuration in his accessory sinuses which I had overlooked and possibly here was a frontal sinus abscess as a result of suppuration, so I immediately explored his frontals and found them perfectly normal. So here was a case which presented the typical symptoms of pressure on the third frontal, but instead of coming from the back it came from the frontal backward.

And it struck me at the time that if a man has explored the brain thoroughly and cannot locate the abscess, that it might be well for him to go forward and explore the frontal. In speaking with Dr. Whiting about the case afterwards, he said that he had had a similar case at the Mount Sinai. He had explored the temporosphenoidal very thoroughly, and couldn't find the abscess, and the neurologist at Mount Sinai asked him to explore the frontal. He took away a section of the frontal, and still could not find an abscess, but an autopsy was performed on that case, and it developed that there was an abscess in the frontal lobe.

Syphilis of the Auricle.

Dr. McCullagh showed a photograph of a case in which the lesion was due to syphilis and which yielded to one dose of salvarsan.

Sinus Thrombosis with Secondary Sinus Thrombosis Extending to the Other Side.

Dr. W. P. Eagleton: This is a case of sinus thrombosis, with a secondary sinus thrombosis extending from the one sinus around to the opposite (chronic in nature) then through the inferior petrosal sinus, then into the neck, causing an abscess of the throat, and treated all this time for restrictive strumitis, because of the abscess being in the throat.

The man was a married man, thirty years of age, and he had been suppurating on and off all his life. He was in his usual health until November 8, 1918, when he complained of right sided earache. On November 19th he vomited after taking some medicine, and was dizzy after having his ear syringed. At this time he had a chill lasting half an hour—remember this was November 19th, and the man died sometime in January. He had another chill on November 27th. He was seen on December 1st by a new family physician who said he had grip. His temperature at this time was 104 and it continued high until five days had passed, and then he got up and went to business. On December 6th he had another chill, and he was still attending to his business. On December 14th, he consulted an oculist, saying: "I see double." The man at this time was going to work, and going to and from the doctor's office, although he had had a number of chills. On December 20th he went to another eye specialist, who reported paralysis of external rectus of right eye; he did not look at the man's ears. On December 27th he returned to his family physician, and went to his office and said he did not feel well, that this double vision bothered him.

On January 2nd, 1919, he went to the same physician, complaining of very severe headache and general itching; he still had diplopia. This was six weeks since the time he had the first earache, or a recurrence of his old trouble. On January 8th he went to Dr. Corwin's office, and Dr. Corwin, after an examination, said he thought the man had an abscess in or near the brain, and told him to go to the infirmary. He didn't feel sick enough to go there, so he went home. He walked home again, about fifteen blocks in all. His wife said during all this time he had had, off and on, nightly chills, and would sleep a good deal. He would go to sleep at any time during the day while sitting in a chair, but felt fairly well, except for progressive weakness during the day. At night he would have chills.

On January 9th, a general physician in Newark described the case to Dr. Barkhorn, saying that the running ear had been emphasized for the first time on that day, that is, that it was the first time that the thought had occurred that the trouble had come from the ears. Dr. Barkhorn, from the early description thought the man nad general ear symptoms, running ear, paralysis of the sixth nerve on the same side, and Gasserian pain.

On the 9th of January, Dr. Barkhorn saw him. He could not make a thorough examination, but found two discharging ears, a large fluctuating mass in the right nasopharynx, and a paralysis of the right sixth nerve in a patient who looked now severely ill. He was yellow in color, was mentally alert, but talked through his nose. Wife said he had pain on swallowing since January 6th. Dr. Barkhorn advised him to come to the infirmary at once. He did not come there until the following day at 3 P. M., January 10th, at which time Dr. Barkhorn made the following notes:

General condition negative except that he looks severely ill, almost typhoidal. Systolic blood pressure, 170; diastolic, 110; bilateral complete paralysis of the sixth nerve, partial paralysis of the right third nerve; bilateral choked disk. He has a swollen and tender gland under the right mastoid, right mastoid tender, but has almost complete destruction of both drums; large fluctuating mass in right nasopharynx; temperature 100; pulse 96; respiration 30. Chief complaint on swallowing and spits a large quantity of grumous material, which increased after manipulation of nasopharyngeal mass. Heard with both ears, with the noise apparatus; each ear tested separately.

As I could not imagine an ear lesion giving a bilateral sixth lesion and a partial right third with a mass in the nasopharynx—

these are Dr. Barkhorn's notes—I decided it was an empyema of the sphenoid pointing into the nasopharynx.

At this time I saw the patient with Dr. Barkhorn, and he said: "Let us incise this abscess." I rather doubted whether there was any pus there, but I said, "Go ahead, incise it." He incised it and Dr. Barkhorn's notes show that he got over an ounce of pus, examination of which showed a mixed infection mostly pneumococci. Bare bone could be palpated extending upward to base of skull. The temperature remained about 100 until the evening of January 11th, when it suddenly jumped to 104.

January 12th, nasopharynx palpated; mass was gone; incision was wide open, draining freely; and bilateral sixth paralysis was slightly better. At this time I personally couldn't get away from the fact that all this trouble began with an earache. The longer I practice medicine, the more I feel that if there is a point of suppuration the cause should be ascertained.

Dr. Barkhorn explored both sphenoids through normal openings, enlarging them; a gelatinous cystic mass was removed from the right side, followed by about 15 drops of seropurulent liquid. Both labyrinths responded normally to the caloric test and the past pointing was normal. No chills. Dr. Eagleton insisted all this time that the ear was the most likely cause of it all, but said he had never seen an abscess of the nasopharynx in such a case.

On January 13, 1919, as optic neuritis was worse and there were hemorrhages in the right retina with persistence of septic temperature, diagnosis of cavernous sinus thrombosis of sphenoidal origin was made. Blood culture was done, but incubator failed to work properly. On January 15th both sphenoids and the posterior ethmoids were examined under cocain anesthesia. Nothing new, except hyperplastic mucous membrane was found. Both recti materially better. Optic neuritis worse. On January 16, 1919, patient getting progressively worse; sepsis continuing. Lastly decided to open the mastoid and explore the sinus, but the patient died while being shaved for right mastoid operation.

Postmortem examination showed a wet brain, with a small chemosis over left parietal hemisphere. Pus and cholesteatoma in the right mastoid with excision of the bone over the sinus. Free pus in the sinus, old organized clot in the lateral sinus extending from the right side to within an inch of the left mastoid; free pus in old clot in right inferior petrosal sinus, and free pus in entire cavernous sinus on both sides. This man had no occipital sinus whatever, on both sides. Right superior petrosal could not be found. Pus in both sphenoids, which may, however, have come up from the throat. On milking the right external jugular, free pus came up from the bulb.

The point of special interest in the case, to which attention is called, are, first, that bilateral paralysis of the sixth nerve is not a localizing feature, showing as it does, only increased intracranial pressure; second, that a retrograde process is possible from the lateral sinus and jugular bulb, through the inferior petrosal to the cavernous sinus, and thence through the pterygoid plexus to the throat, to form an abscess in the nasopharynx, instead of the reverse process, through a peritonsillar or other abscess through the pterygoid plexus to the cavernous sinus. Third, given a chronic running ear with evidences of intracranial pressure, the law of chance is always in favor of the ear as the etiologic factor. Fourth, there was no exophthalmos, etc., because it was a slow process of venous drainage through the vesalius and other veins.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of October 6, 1919.

THE PRESIDENT, DR. ELMER KENYON, IN THE CHAIR.

Paper: "Suspension Laryngoscopy as a Means of Diagnostic and Operative Approach to the Larynx."

By R. C. LYNCH, M. D.,
New Orleans.*

Paper: "Direct Laryngoscopy Without Suspension as a Means of Diagnostic and Operative Approach to the Larynx."†

By STANTON A. FRIEDBERG, M. D.

Dr. Otto T. Freer discussed

Indirect Laryngoscopy as a Means of Diagnostic and Operative Approach to the Larynx.

Dr. Freer said that direct and suspension laryngoscopy had been understood by many as displacing the indirect method, for the removal of intralaryngeal growths, and this attitude was leading to an unfortunate neglect of the acquirement of proficiency in mirror operative work in favor of the easier technic of direct laryngoscopy, the result being that disproportionately formidable and forcible procedures are used for the removal of solitary papillomata and fibromata which could be deftly and quickly removed by the mirror method without the patient's being aware that he was being operated upon. The difference between direct and indirect operating in these cases being that between forcible entry into the upper air passages and elegant sleight of hand accomplishment of the same end.

The indirect method had been greatly improved in modern times by special electric illumination which represents an enormous advance in lighting the larynx since the days when Manuel Garcia founded the science of laryngoscopy. It was wonderful, however, what the old heroes of laryngology accomplished with the shadowy light reflected from a student's lamp or an argand burner. The use of brilliant electric bulbs for reflection was a great improvement over such lights, but laryngeal and tracheal lighting still remained primitive until the lamp devised in accord with optically correct principles by the genius, Kirstein, of Berlin appeared, the Kirstein lamp, which its author called "the shining eye," as its rays are parallel to the axis of the eye and hence virtually are emitted by it. The Kirstein light emits a long searchlight pencil of light, so that it has a practically endless focus and is always in focus for any object, whether two inches or twenty feet away. Thus it will light the walls and bottom of the longest bronchoscopy tube with equal brilliancy so that fine print may be read at the end of the tube. The popular head mirror, on the other hand, does not give a long pencil of light like that of a searchlight, but has a focal point of from six inches to twelve inches, the intensity of illumination rapidly diminishing a few inches in front of and behind this focal point. For this reason the head mirror has no depth of illumination, and even with a bright light for reflection will only light up the first few rings of the trachea, while the Kirstein lamp will brightly illuminate the bifurcation of the bronchi, a thing the head mirror can only be made to do if sunlight is used. The Kirstein lamp has been made many times more effectve in late years by the use of the three filament, or "umbrella filament" miniature lamp devised by Brünings. Unfortunate, because of war effects, the Kirstein lamp is practically unobtainable and a supply from Germany must be awaited.

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*See page 416

†See page 410.

The Kirstein lamp requires a rheostat to regulate the brightness of the light and a carbon lamp in series to diminish the current, so that the little lamp may not burn out. Unfortunately, almost uniformly, the dealers sold the lamp with a carbon resistance lamp of small amperage so that the Kirstein lamp could only give a dim light when connected. This led many who did not understand the matter to return the lamp to the dealer and had hurt the popularity of the lamp.

Another improvement in laryngoscopy of recent date has been the use of thin laryngeal mirrors. Laryngeal mirrors give a double image, a brilliant one from the mercury back and a shadowy one reflected from the surface of the glass. This shadowy image is not noticeable where a thin mirror is used, but is very disturbing in a thick mirror. At present the thin mirrors are scarce, as they are of German make.

Of late Dr. Freer has been using anesthesin as a local anesthetic in laryngoscopic examinations of short duration. It acts much more promptly than cocain and does not lead to the temporary retching that is often created by cocain in sensitive throats. It is used in powder form by insufflation. The anesthesia is rapid but transient. As anesthesin is entirely nontoxic, it forms a very desirable substitute for cocain.

The unpleasant features of suspension laryngoscopy are not enough emphasized. Pain in the teeth, inability to swallow for a day or two, and stiffness and pain in the neck may follow the procedure, especially in the case of adults, with rigid, short necks. There is a great difference in individuals in regard to the ease with with a complete view of the cords may be obtained, and Dr. Lynch's adjustments have to be used with undesirable force in a number of cases, while in others the laryngeal interior is seen with delightful ease. However, whatever the position used, the new one of Dr. Lynch's or the Killian, the fact is that the tongue is crushed down until the chin and sternum are in a straight line, while the tenseness of the skin and tissues between these two points is like that of a violin string. Such a procedure is vastly more uncomfortable to the patient than the passage of a mirror and of delicate forceps into the throat. He suggested, therefore, that suspension laryngoscopy be reserved for the cases of extensive intralaryngeal disease beyond the limited capacity of indirect laryngoscopy. That method and direct laryngoscopy are the higher court, as it were, but the indirect method should be used first whenever feasible.

To ease the strain on the teeth in suspension, Dr. Freer found Dr. Lynch's dental spoons, molded to the teeth by filling of the spoon with a plastic, hardening dental mass, a perfect protection and did not feel like giving them up, though he had learned that Dr. Lynch no longer used the spoons.

Both suspension and direct laryngoscopy distort the region of the tongue and epiglottis, and the instruments used even cover up the tongue to the epiglottis so that the region of the valleculæ, of the base of the tongue and of the lingual surface of the epiglottis has to be treated by the old indirect method because unsuited to the direct one.

Dr. Freer could not understand why Dr. Chevalier Jackson and Dr. Friedberg denied children local anesthesia in their direct laryngoscopic work. Why not let them have the comfort of an anesthetized throat? Dr. Freer had cocainized the throats of children for many years in order to see with the postnasal mirror, and they usually permit its use if they are older than four years. The great Englishman, Sir St. Clair Thomson, recently advocated cocainization of the trachea for manipulations therein, and Dr. Freer had found the absence of cough reflex following its use in the upper air passages and trachea a great help.

It had been stated by Dr. Friedberg that there was no danger in passing a bronchoscopy tube through the glottis in children. This was not the speaker's experience. He referred to a case where after a preliminary tracheotomy done as a precaution he carefully passed a tube without difficulty through the larynx and extracted a piece of bone from the trachea. A few hours afterward edema of the glottis developed, which would have led to suffocation but for the tracheotomy tube in the trachea. Edema of the glottis also occurred in another patient saved by the same measure, a preliminary tracheotomy. A third case had come to the speaker's knowledge where the lack of a preliminary tracheotomy led to the suffocation of the little patient who had been subjected to bronchoscopy. Towards the end of his career Dr. Ingals told him that he felt more and more in favor of lower direct bronchoscopy for children, as it made the search for foreign bodies so much easier and shorter and safer.

The position for direct laryngoscopy mentioned by Dr. Friedberg, with the cervical part of the spinal column bent forward and the head extended backward at the occiput, was first described by Boyce.

Dr. Freer thought that the surgery of the larynx in malignant disease was being greatly changed by the use of radium. By means of hollow steel needles heavily screened with platinum and containing 5 to 12 milligrams of a radium salt or of radium emanation, the needles devised by Dr. Frank Edward Simpson of Chicago, it has become possible, using a needle introducer devised by Dr.

Freer, to introduce these needles into any part of the base of the tongue, the valleculæ, the aryepiglottic folds, the vocal cords or ventricular bands, the needles being secured from being swallowed or lost by a stout silk thread passed through the eye of the needle and attached to the cheek by adhesive plaster. The needles are left in the tissues for from six to fourteen hours. Both the needles and the holder were mentioned last July and shown in an illustration in the Journal of the American Medical Association by Dr. Robert Herbst, without credit to either Dr. Simpson or Dr. Freer, and he found it necessary to mention this here to secure their priority. Previously to the appearance of Dr. Herbst's article he described the needle and introducer at the 1918 meeting of the American Laryngological Association, and this description was published in the Transactions of the A. L. A. for 1918.

To show the influence of the needling in a favorable case, three needles were introduced into the base of the tongue and epiglottis of a patient who had a cancerous ulceration of those parts, the microscopic diagnosis of carcinoma having been made by Dr. Gordon Wilson. After four months of pain and gradual shrinkage and cicatrization of the affected part, all signs of carcinoma disappeared and the patient had remained well since then, a period of two years. Where a malignant growth has entered too far into the deeper and vital tissues, so brilliant a result may not be expected, but in the speaker's experience there are few cases that do not show marked impprovement.

The advantage of the radium needle over the surface application of radium is that the radiation takes place from the heart of the growth and so reaches all parts of the cancerous mass, including its depths, evenly. Several needles are used, so that the desirable "crossfiring" of the rays is obtained. The vulnerable integument is spared so that ulceration does not occur. The needles are so well screened that in the rather extensive use of the needles he had never seen a radium burn.

DISCUSSION.

Dr. L. W. Dean, Iowa City, said that for many years he had thought that he was imitating the technic of Dr. Lynch in doing the suspension work on the larynx, but since seeing him work and talking with him he had come to the conclusion that this was not the case. In only a few cases of tumor of the larynx had he thought of using the general anesthetic. He cited the case of a patient seen recently with what he diagnosed as laryngeal tuberculosis. The patient had a strongly positive Wassermann reaction, and in spite of the clinical picture they were in doubt as to what the condition was. With their ordinary procedure of giving a hypodermic of morphin and atropin and cocainizing the larynx, using cocain and some adrenalin on a cotton swab in the larynx, placing it in contact with the larynx for some length of time, they produced anesthesia so that the patient was readily suspended, and fully twelve individuals walked around and took a look at the larynx with the head mirror. The patient was perfectly quiet. They had no difficult in removing a piece of the growth for examination. With infants and very young children he used a Jackson's speculum for the examination of the larynx and removal of pieces for diagnostic purposes. He felt that infants and very young children could hardly be controlled under local anesthesia sufficiently for suspension laryngoscopy. He did not see many laryngeal tumors and had not much experience in the removal of these growths by suspension or other methods. He did, however, see a great many cases of laryngeal tuberculosis, and in his judgment Dr. Lynch's was the best method of handling these cases. Before Dr. Lynch furnished the profession with these excellent instruments he was accustomed to use the direct speculum. With the introduction of the Killian method he used that, but it was unsatisfactory, and he went back to the direct method. When Dr. Lynch gave the profession his suspension apparatus he adopted that in his clinic and has used it exclusively since. The patients were not necessarily suspended by himself; sometimes they were suspended and treated and cauterized, or what not, by the junior assistants. They did the work very nicely. He considered the method an easy one. But at the same time he had tried, under general anesthesia, to suspend and expose a growth similar to the one Dr. Lynch had operated at the clinic, and remove the growth, but he had not been successful. In his opinion, for the most difficult cases the operation certainly needed a master hand. After having seen Dr. Lynch do the work he was sure that he would be able to do better work with similar cases in the future, as he saw where his technic could be improved.

In many instances under local anesthesia, when the cases were suspended the patients thought they were going to choke and suffocate, but he had been able to overcome this by reassurance. As a rule there was no difficulty, even at the first suspension, and none at subsequent ones. After the patient was suspended, then came the question of removing the tuberculous mass and then cauterizing the edge. In his opinion, much better work could be done in suspension, using the long needle, so that the right hand could be steadied with the left, and he believed this far preferable to the direct or indirect laryngoscopy.

Dr. Dean asked for an expression of Dr. Lynch's opinion as to the use of local anesthesia.

Dr. Lynch (replying to Dr. Dean) stated that he had probably used local anesthesia less than he should. His patients readily consented to the general anesthetic, and he had never had accidents with it which would make him change from a general to a local anesthetic. It might be different with tubercular patients with involvement of the larynx of a tubercular nature who are naturally weak. He had had some cases suspended for one hour and one for three-quarters of an hour under local anesthesia with perfect comfort so far as the patient was concerned and no particular pain afterwards, except perhaps a little pain on moving the head forward, or at the corner of the jaw. In one instance a young negro was suspended and some seventy men viewed her, this being done under cocain, with her apparent comfort. As a general rule, the cases coming for suspension were of two classes: either the child in which the local anesthetic was of no value, particularly as they were naturally frightened by the procedure anyhow. If someone could anesthetize their psychologic condition, then the local anesthetic would be ideal. In the adults, where the condition is not tuberculous, he could see no advantage in local over general anesthetic, aside from the fact that the operation was apt to be a failure under local if the tension of the muscles was too great to permit of a straight view. This was true particularly in cases of carcinoma and malignant tumors of the larynx. It was quite likely that the last case seen at the clinic could not have been suspended under local anesthetics. The point of trouble was too far away to suspend him with any degree of comfort to himself. It was very difficult to do good work if the patient was showing outward evidence of suffering. In his opinion, it was possible to do suspension under local anesthesia when the psychology of the patient was right, where the disposition of the patient was right and where those things prevailed in the same individual, especially if the procedure was not a long one. He certainly would not attempt the dissection of a malignant tumor from the larynx under a local anesthetic, because one might get started and have to stop because of the inherent fear that the patient has of choking to death, and if, as sometimes happens, one had to stop operation for the insertion of a rubber tube for breathing purposes, that would greatly frighten the patient if he was under local anesthesia. In his opinion, suspension was practical under local anesthesia if conditions were proper for it. If not, the local anesthetic was contraindicated, and the general anesthetic was the most satisfactory most of the time.

Dr. Stanton A. Friedberg thought that in very young children there was very little to be gained under local anesthetic. The child was frightened before one began work, and the mouth had to be forced several times in order to apply the anesthetic. The fright was increased as the examination continued, and it was doubtful if the deeper part of the larynx could be reached. With the direct method it was a simple matter to introduce the speculum and the bronchoscope also, if necessary, and delay was avoided. There was, of course, some discomfort connected with the method, but there was a question as to whether or not cocain in children was dangerous. He recalled that several years ago Ingals had stated that death had occurred in young children in two instances where no other reason could be ascribed than the use of cocain. He felt that the advantages, if any, were outweighed by the disadvantages, and that one was really doing the best for the child by doing the work as rapidly as possible. As a matter of fact, there was more discomfort than actual pain connected with the examination, as the statements of children old enough to understand will prove. He was not a fanatic, as Dr. Freer had inferred, in the matter of the use of direct laryngoscopy. There were many things which he liked to do with the indirect method also.

Dr. Thomas Hubbard, Toledo, Ohio, said that in a special art like suspension laryngoscopy, it was a good thing to get down to details. Dr. Lynch had developed a very important instrument—an improvement on the Killian—but there were certain precautions on account of the increased strength. Dr. Lynch, in closing the discussion, would do well to emphasize these points. He had noticed at the clinic that the incisor hooks rested against the front teeth and there was danger of an accident. Dr. Lynch has had so much more experience in this line he should give his conclusions in closing the discussion.

The length of the spatula was another important thing, and he thought a good many operators had failed because they had not properly adapted the spatula. The downward thrust screw increases the length, but in his opinion it was better to have the proper length spatula than to try and increase it by the downward thrust. One cannot always judge the length of the spatula to be used by the size and age of the patient, for the depth of the larynx may vary in patients, even of similar age and physique.

There was one thing about suspension laryngoscopy which has a bearing on the question of general anesthetic. In observing the cases at the clinic in the afternoon, one saw that with the first insertion of the spatula there was interference with respiration, a transient cyanosis. That meant that the spatula pressed upon the arytenoids and brought them slightly forward, and before it got to the anterior angle of the larynx it probably closed it to respiration. Following that, the respiration was perfectly free. Anesthetists were more and more convinced that dyspnea, cyanosis or asphyxiation are factors in shock, varying in severity in individuals. In many cases, and particularly in mouth and throat operations, the degree of shock may be determined by degree of cyanosis. There was one comforting thing about suspension laryngoscopy: one feels that he can secure free respiration, even more positively than with a tracheotomy canula. With control of the tongue and an open larynx, this element of shock is removed. These patients come out of the suspension operation with a minimum of shock and with very little or no traumatism. These factors, in his opinion, removed objections to the general anesthesia, and in his work he was very partial to a deep ether anesthesia. Morphin and atropin should be used sparingly.

Dr. Hubbard was very glad to hear Dr. Freer speak of the Kirstein light. In his opinion, Kirstein was the genius who made possible all of this progress. He left the practice of medicine in disgust because hs method was not properly recognized. The headlight and also the spaptula for direct examination of the larynx paved the way for bronchoscopy. Suspension laryngoscopy is today the crowning achievement, and we all honor Dr. Lynch for his part in perfecting the method. It is a great accomplishment to aid in developing intralaryngeal surgery up to the point where it can be called deliberate, precise surgery.

Dr. Harry L. Pollock, Chicago, said that he had had the pleasure of reading a paper on this subject three years ago, at which time Dr. Lynch was present. At that time Dr. Pollock stated that they had tried Dr. Lynch's method of suspension—that is, his position relative to the table. They had been in the habit of hanging their patients over the top of the table and suspending them after the fashion of Killian, but this method had not been successful in their hands. It was not until the spring of 1919 that the speaker had the pleasure of visiting Dr. Lynch and seeing him use his method, that he realized just what it meant, since which time he has been using this method and could truthfully say it is much more simple than hanging the head over the edge of the table.

In regard to the use of anesthetics, it was their custom to use local anesthesia, particularly cocain crystals, by means of the applicator tube, in 1/10,000 adrenalin, for the purpose of taking up the cocain. He had never seen any cocain poisoning. Once in a while, when it was necessary to use a good deal of the drug, they did get a little exhilaration, but that subsided quickly. Four years ago, at one of the society meetings, Dr. Pollock had suspended a patient, and he had been in that condition for forty-five minutes without any discomfort—in fact, he seemed to rather enjoy it. In young children it was different, and one had to have a general anesthetic. In the beginning the patients would complain of the choking feeling, but if they were told beforehand that the medicine would make them feel as if they were going to choke, after the first little attack was over they would lie quiet and he could keep them suspended for half an hour without any trouble. There was no pain except a little at the back of the neck, and sometimes if the hooks that hold the teeth were not properly adjusted they complained of pain in the upper teeth.

He did not know whether it was possible to use a cautery with safety in general anesthesia, but a week or so previously he had had a patient sent to him who had a web at the anterior commissure, so that there was only a little breathing space. This had been cut twice, the last time six months before. He thought the best way to remove it would be by means of the cautery, and he suspended the young lady without any difficulty and used this cautery, but it was necessary to use both hands to hold the cautery point. The cautery point was quite long, and it would shake a little bit unless it was steadied with the other hand, when it could be put where one wished it.

They had not had many cases of tuberculous laryngitis, but in those few it was easy to suspend them by local anesthesia, and they could be curetted with a long curette just where one wished to use it, steadying the right hand with the left. It had been his custom to apply a little trichloracetic acid on the end of the probe over these ulcers, and that could be done in just the same way. In cases of simple multiple papilloma, he thought they could be suspended under general anesthesia. Just recently a patient was suspended and choked very rapidly, and it was necessary to do a tracheotomy, and after this was done he was suspended again and curetted and the entire mass was removed. The tube was left in for four or five days, but it was plugged up to see if the patient could breathe all right before removing the tube. As there was no difficulty, the tube was removed and the tracheotomy wound healed rapidly. This happened three or four months ago, and the child had been perfect ever since. He thought Dr. Lynch had stated that the simple papillomata of children, if left alone until they were seven or eight years of age, would gradually disappear spontaneously. This boy he had referred to was eleven years old, and the papilloma started when he was ten. At the time Dr. Pollock read his paper Dr. Lynch stated that he had operated on one case thirty-three times for multiple papilloma. In Dr. Pollock's experience it was not necessary to operate so often. Dr. Lynch said he sometimes operated every two weeks, but the speaker did not think it was necessary to operate until the mass had filled up the larynx again, and then it was not necessary to do so many suspensions.

Dr. Pollock could see no comparison whatever between the two methods for laryngeal work. Of course, in the examination one used the two methods; direct laryngoscopy was not used for simple examination; but if there were tumors in the larynx, the principle thing was that one had the field in front of them and they could work with both hands free, a big advantage over having one hand only.

Dr. Stanton A. Friedberg was of the opinion that all three methods were necessary for laryngologic work. If a patient came in with a little nodule on the cord, it could be approached with infinitely less trouble by the indirect method. The point he made was that the direct speculum was of especial value in young children, and in certain simple operative procedures. In conditions that were especially difficult it could not be compared with suspension. Each method had its distinct advantages and in order to perfect oneself in laryngology it was necessary to be familiar with all. There were some things which Dr. Lynch did under suspension that Dr. Friedberg thought he could do as well under simple direct laryngoscopy. He recalled that at one time Dr. Lynch advocated suspension laryngoscopy as a preliminary to bronchoscopy, but the speaker felt that he could do the latter as advantageously and in less time by the simple method.

Dr. Lynch thought that everyone was of the same opinion so far as the merit of suspension was concerned. He thought nothing would ever replace the mirror in laryngology, but if it took one as long to learn how to properly remove a tumor from the larynx with the forceps and a mirror—if it took him as long to use suspension as it did to use that operation he was afraid that suspension would have been given up long ago. He went through the school of indirect laryngoscopy long ago, and it took a great deal of practice and perseverance in order to do the operation artistically, for primarily it is an artistic operation. There was no doubt that a great deal of work that was done under suspension could be done under the indirect method. Certainly a large part could be done by the direct method, but when one had learned suspension it could be done best by suspension.

As to the tooth plate, at home he used lead foil, about 1/16 of an inch thick, folding it over the incisor teeth a little, the portion that runs upon the gingival mucous membrane, and permitting it to project down far enough so as to make it take up some of the pressure of the outward pull. As a matter of fact, in the new position the outward pull was very slight as compared with the old position, and since he used the new position with the lead foil, he had no accidents whatever. He always reported accidents as well as the successes, for he felt that it was proper for the profession to know what had happened to him in order to avoid it themselves. In one case they broke six teeth from the upper jaw with a portion of the alveolar process, the patient being hung in the old position. The man is 68 years old, with perfectly good teeth; they were worn down considerably but seemed to be thoroughly fixed in their alveolar process, but six of them broke off. They were wired into place and fortunately grew back in again. This man had a cancer of the larynx. He thought it might be interesting to know that tracheotomy was performed on him and 55 mg. of radium put into his trachea, tied in between two threads, one tied to the back teeth of his upper jaw and the other to the opposite side. They had a good view of the larynx to see that it was in opposition to the growth. This was left in for eight hours. There was no difference appreciable in two weeks. The same application was made at the end of four weeks, the same amount of radium being left in four hours. Following the second application of radium, in two weeks, evidences of a radium burn began to appear around the tracheotomy wound, with no evidence of burn around the larynx. The man died from hemorrhage of the internal jugular, which started from a slough from the burn around the tracheotomy wound. There was no evidence of radium burn about the larynx.

Dr. Lynch was of the opinion that the selection of a spatula for the individual case was a matter of experience. The best way to judge this was by accustoming oneself in tonsil operations to the distance from the upper jaw to the epiglottis. By trying the spatula first, as he had suggested before, with a mouth gag in place, one can lift with his hand so as to see the epiglottis, and in many instances one would be surprised at the view that could be obtained. He thought it was much better to fit the spatula to the case than to depend upon the screw to drive it down over the face of the epiglottis. The best views were acquired when the spatula was fitted right than when it was made longer by changing the screw. The best method was to deliberately place the spatula on the base of the tongue, so as to leave the epiglottis free. This had two advantages; it brought the epiglottis into view for operative work, and bringing it into view better than where the tip of the spatula dips down into the larynx so that the arytenoids are interfered with. He preferred not to have the tip of the spatula so far down. As long as the epiglottis was out of the way, the movement of the vocal cords did not seem to interfere. He could not see any particular advantage by having the spatula go deeper than the cavity of the larynx.

As to the question of cyanosis as associated with shock, they came into contact with that sometimes in papillomatous cases, and in many instances suspension of these cases had to be done rapidly with the idea of passing a bonchoscope for the maintenance of respiration, until the cyanosis had cleared up and the respiration was carried on with the bronchoscope in situ so it was well to open up the field sufficiently wide that respiration might be carried on without the aid of the bronchoscope. In some of the papillomatous cases obstruction was extreme, and they never entered one of those cases without a tracheotomy set at hand. So far they had not had to do a rapid tracheotomy on a patient while being suspended, but they had saved themselves from this on a number of occasions by the rapid introduction of the bronchoscope when the suspension apparatus had been properly placed.

In the local anesthesia in suspension, it had been his custom to cocainize the uvula, with a cotton mop saturated with one per cent of cocain, and then one application of this to the tongue at the lingual face of the epiglottis, and then two or three applications of the powdered cocain dipped in adrenalin to the base of the tongue, the laryngeal face of the epiglottis, and the upper surface of the arytenoids, and then drop two to four drops of a ten per cent solution of cocain into the larynx. That gives sufficient anesthesia to permit of proceeding with the operation. He thought that the comfort of the local anesthesia might be increased by a previous dose of morphin and scopolamin, which they had used a good many times with success.

As to the use of the cautery in general anesthesia they used it in many cases under general anesthesia and had no accident to report up to this time. The technic in this operation is that the cautery point was tested away from the ether and ether apparatus with care and the point was placed in contact with the growth before the heat was turned on. If it was not too hot, there was no danger of explosion with ether or ether vapor. They had cauterized a sufficient number of times to say that there was no danger, if this technic was followed.

Linear cauterization for reduction of hypertrophy of the vocal cords, occurring either previous to or following endolaryngeal operation, would tighten up the cord and reduce its size, and restore the voice, in what might seem a most remarkable way. This was done with a Yankauer cautery with the finest point.

In regard to papilloma, their cases so far numbered fifty-five. The younger the papilloma the harder it was to control and he agreed with Dr. Pollock that the fewer the operations the better for the patient. He had had sixteen cases without recurrence, removal without recurrence, and the older the patient the less likely there was to be recurrence, and the most pedunculated the papilloma the elss likely the recurrence. He had run into a class of papillomas which were as near malignant as anything he had ever seen, except the induration, the involvement of the subcutaneous or submucous tissue and metastases. He thought there was no doubt but that there was a psychologic moment for the disappearance of papilloma. He believed the best method for the treatment of these conditions was a cauterizing agent or dessicating agent, such a fulguration, or the acid nitrate of mercury. The acid nitrate of mercury, sixty-two per cent U. S. P. had given him more comfort from the chemical standpoint than anything he had ever tried, and the fulguration more than any electrical appliance. In his fifty-five cases of papillomas two were females, the rest males. About two weeks previously he had had a very unusual accident in one of the papillomatous cases. This was a little girl three and a half years old on whom they had operated five times in a year and a half. At this sitting there was one mass growing from beneath the right cord and two small blood tumors growing in the neighborhood of the ventricle above the cord. The fluid masses were cauterized with actual cauteries and the small mass below the cord was removed with forceps and knife, and the base was cauterized with acid nitrate of mercury. Nothing occurred at the time of operation which made him feel the least concern for the little patient, and this was done at ten o'clock in the morning. At three o'clock in the afternoon she developed emphysema, which necessitated tracheotomy for its relief at nine o'clock that night. He had no idea why the emphysema occurred, but told of it as one of the things that one might find of value. At the present time he could say he considered the dissection of a papilloma from the larynx an unsuccessful procedure, and wished to contradict what he had said five years ago. That is, if a papilloma could be absolutely properly dissected from the larynx there would be no recurrence. He had felt on any number of occasions that he had thoroughly cleaned the larynx from any papilloma, with their almost immediate recurrence, and he now felt that some of these cases now under his observaton and had been for two years were at this time worse than when he started on them. They had thus far not lost a case in the fifty-five, and those that were cured were permanently cured and had tone to the voice. Of that number there were about twelve in the active state of medication, operative procedure, observation, etc.

Dr. Norval H. Pierce asked whether Dr. Lynch regarded suspension laryngoscopy as entirely replacing laryngofissure, and whether one could use fulguration during the general anesthetic.

Dr. Lynch said that he did not so consider it. He used fulguration during general anesthesia, using the military apparatus with the mouthpiece over the mouth, but before they start the cautery this is removed and the cautery is usually of very short duration. They use the same technic with fulguration that is used with the cautery point and have had no accidents with either one, but they never start the current until both the cautery point and fulguration point are in place for their work.

As to suspension and laryngofissure, he had mentioned the fact, especially in consideration of malignant cases, which cases are suitable for suspension and which for laryngofissure, and he thought that if a procedure could best be done by laryngofissure it should be done that way. He thought the selection of the best method was for one's own judgment, but it was very illuminating to him to do a laryngofissure with a patient under suspension. He thought if anyone could have an opportunity of doing or seeing an operation under that tube he would appreciate the great advantage of the two-way view.

So far as his personal experience went, he had never seen a cure of an intralaryngeal tumor of the larynx by radium. He had not used a radium needle as described by Dr. Freer and had none at his disposal. He had used radium externally and intralaryngeally, applied in proximation to the tumor, on any number of occasions, and had applied it in the esophagus on any number of occasions, and in not one of these could he record anything that he regarded as a cure of an improvement.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of November 3, 1919.

THE PRESIDENT, DR. ELMER L. KENYON, IN THE CHAIR.

Dr. C. Johnston Davis gave a lantern slide demonstration of

War Injuries of the Head.

In the radiographic examination of those cases of head injuries where the accessory sinuses or the mastoids were involved, or where disease was suspected, they used a technic which they found especially useful in exposing these regions. In the examination of the frontals, ethmoids and supramaxillary sinuses two plates were made—i. e., anteroposterior and lateral.

For the anteroposterior view the patient was placed prone on the table, the face resting on an 8x10 plate placed on an inclined plane. The degree of the plane was immaterial, for it was used only for the comfort of the patient. The tube was brought close to the head, centered and tilted so that the central ray passed through the head at an angle of 23 degrees to an imaginary line passing through the glabella and the external auditory meatus. In this position the shadow of the heavy petrous portion of the temporal bone was placed at the lower third of the orbit and the upper third of the antrum, a region of but little importance in the examination of these pneumatic cavities.

For the lateral view the patient was placed on his side, with the affected side of the head next to an 8x10 plate resting on a small platform. The head was so placed that the sagittal suture lay in the same plane as the plate. The head was then clamped in position and the tube brought close so the central ray passed through the pupils of both eyes when viewed from before backward and about 3 cm. posterior to the supraorbital ridge. In this position the depth of the frontal sinus and the thickness of the anterior and posterior walls were readily determined. It was absolutely necessary to know this before the character of the sinus disease could be determined. In this position the anterior and posterior ethmoidal cells showed clearly or not, depending on their being free from disease, also the shadows of the anterior and posterior clinoids and the lateral view of the sphenoid.

In examining both sphenoids the patient was placed in a sitting position, the chin projected forward, resting on an 8x10 plate placed on an inclined plane of 25 degrees. The tube was brought close to the head, centered and tilted so that the central ray passed through the head about 3 cm. anterior to the external auditory meatus, striking the plate a little short of a right angle. The developed plate showed the sphenoids posterior to the larynx and the degree of their involvement could readily be determined.

In the examination of the mastoids, both mastoids were placed on the same plate for comparison, the occiput being in the center of the plate. The patient lay on his side with the right or left mastoid, as the case might be, next to one-half of an 8x10 plate, the opposite half being covered with a piece of sheet lead. The pinna of the ear was folded forward and the head clamped in position. The tube was brought close to the head and tilted 15 degrees toward the face and 15 degrees toward the feet and so centered that the central ray entered the head at a point 8 cm. posterior and 8 cm. above the external auditory meatus of the upper ear—that is, the ear nearest the tube. This position showed well all the cells of the mastoid, including those cells which might be obscured by the posterior border of the petrous. Stereoscopic plates were made of all mastoids, which, compared with the flat plates gave much additional information.

The slides shown represented in a small way the type of head injuries received at the U. S. A. General Hospital No. 11, located at Camp May, N. J., and known as the Special Overseas Head Hospital. Cranioplasties were done in those cases where the loss of bone was so great that the operation was indicated for cosmetic or prophylactic reasons.

No attempt was made to remove deep intercranial foreign bodies. It was surprising to note how few were the symptoms produced by these pieces of shrapnel and high explosive shells. This might be explained by their position, the majority lying in the falx cerebelli. Those lying in the motor regions of the cortex and producing symptoms were removed by magnet, invariably with good results. They were much impressed with the clean condition of all the head injuries. Wounds were invariably sterile and in but a few cases had bone fragments or small foreign bodies been left.

The slides showing the injuries of the jaw and upper face represented the type of fractures with loss of bone tissue resulting from modern warfare. In a few cases they were able to demonstrate new bone cells, which was of great help in determining future treatment. In those cases where nonunion existed after three months' treatment bone grafts were used. Their experience agreed with that of the British, that it was a waste of time to expect union after this time. Where the X-rays showed teeth in the area of defect they were invariably extracted.

Chronic sinusitis was in a majority of cases due to retained small foreign bodies. The slides showed a few of these cases. An interesting case was one in which a small fragment of high explosive shell penetrated the right cheek and was found lying in the sphenoid at the midline. The only symptom was a slight restriction of both fields, which during the four months of observation gradually cleared.

All foreign bodies of the mastoids and sinuses with but few exceptions, whether producing symptoms or not, were removed.

DISCUSSION.

Dr. Joseph Beck took great pleasure in discussing the splendid presentation of Dr. Davis, and thought the society was greatly indebted to him for bringing such a wealth of material to them.

It would be of value to many men, particularly those who were still in doubt regarding the value of the X-ray in the diagnosis of sinus and mastoid disease. Most of the slides demonstrated war injuries and the presence of foreign bodies, conditions not often dealt with in private practice, but several interesting points had been brought out from the roentgenologic study. Many of the slides, as he viewed them, if they were single, were not anatomically correct and if one tried to base a diagnosis upon the socalled faulty position they would not get the true sinus and often got findings that were confusing.

He had followed the method as first brought by Killian and had never found it wanting; in having the patient placed on his stomach, or sitting up, with the head at an angle of twenty-five degrees from the flat table, when the picture was taken with the target above the occiput the result would correspond so exactly in size that he could take a model from the radiogram and find that it would not vary in the slightest. He would find the sinus just as the picture outlined it. For single pictures Dr. Beck thought this position was the best.

In the stereoscopic photograph it did not matter whether the head was flat on the table or not, because when the pictures were placed together they gave the position in which the head was taken. If the head was flat on the table the plate would give the exact position and, consequently, the pathologic condition could well be made out.

Dr. Beck was glad that Dr. Davis stated that the pathologic condition was shown by the radiogram. He had spoken several years ago of making a diagnosis of the various kinds of mastoid disease, especially in the acute forms of ear diseases, but it was also possible to make it in the chronic conditions. For instance, in fibrosis of the bone, associated with fistula formation, and with fistula and cholesteatoma cavity, of syphilis and tumors, it could be quite easily done. In the acute conditions he could easily separate the pathologic conditions by means of the X-ray picture, from those of the confluent conditions and those much more grave conditions of the osteophlebitic type in which the cells were still retained and the picture was darker because the bone was still present. This was a very important point in diagnosis. He had been using, for more than three years, the Roentgen ray in the diagnosis of otosclerosis. Whether this would be of value or not was still to be proven when the cases could be diagnosed postmortem, but clinically he could show early cases of otosclerosis, rapidly progressing cases with the retrogressive change of the bony capsule of the labyrinth in the vicinity of the fenestra ovalis.

Dr. Alfred Lewy asked Dr. Davis to repeat in detail his technic in mastoid diagnosis.

Dr. C. Johnston Davis stated, in regard to the position for sinus examination, that several positions had been worked out by different men. The position he described he had found to suit his purpose very well, but nearly every man who attempted radiology of the head employed his own particular technic. In diagnosing sinus plates the entire plate must be considered. In many instances the report of the radiologist stated that there was a shadow in the region of the left antrum or frontal sinus. The shadow per se meant nothing; it might be a normal shadow for that sinus. With a shallow sinus, or a sinus with a very thick wall, there would be a more or less dense shadow which would simulate the shadow of a very deep frontal sinus with granulation tissue or dense pus. So it was necessary to study the density of the plates before attempting to interpret the shadows.

Regarding the diagnosis of the different forms of mastoid disease, they had found in the army that they could give the surgeon a great deal of information, especially after making the stereoplates, which he was unable to obtain in any other way. At Manhattan Eye, Ear, Nose and Throat Hospital, New York, they had used the single plates and their diagnosis was limited to the gross pathology. In the stereoplates they could look into the cells very clearly, and had been able to distinguish between granulation tissue and pus in a few cases, but not between thin pus and fine granulation tissue. Both mastoids were taken, for comparison. They had evolved a technic whereby both mastoids could be placed on the same plate, and studied stereoscopically. After the head was placed on the plate the tube was centered so that the central ray would pass through the mastoid at an angle of fifteen degrees toward the feet and fifteen toward the face.

Paper: Dermoids of the Anterior Mediastinum, with Report of a Case.*

By ROBERT SONNENSCHEIN, M. D.

DISCUSSION.

Dr. A. A. Goldsmith said that he had the pleasure of seeing this patient four or five years ago and he believed that if he saw a similar case today he could come to better conclusions than he could at that time. Some X-ray plates had been taken at Wesley Hospital, but had been destroyed With the improved technic of today one could come to the decision, at least, that they were dealing with a cyst. The average malignant tumor in the mediastinum was usually irregular in shape, rapid in growth, and in the X-ray showed finger-like processes running out in all directions, whereas with the dermoid one saw a well-rounded cyst outline. In this patient he had thought she was suffering from a thymus, because that was the ordinary thing to be thought of.

In differentiating between malignant tumors and benign the marked dyspnea and symptoms of pressure upon the veins should be considered. It was very common to have the enlarged veins upon the abdomen in these chronic cases, and that was less common in the acute forms. In this case the patient had beneath the sternum a mass which was accessible to palpation.

Dr. J. Holinger thought that the presentation of Dr. Sonnenschein was interesting from the embryologic standpoint. He had hoped that the doctor would enter a little more into that phase of the subject. It was very peculiar to have a new formation of ectodermal nature between the mesodermal and endodermal structures.

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*See page 427.

Embryologically two features seemed to be very extraordinary in this tumor. The first one was that the location in the thorax showed that cell material must have been thrown in an abnormal position at a very early state of development, that is, before the thorax was closed. The second feature was that the tumor was not quite in the middle line.

Major W. F. von Zelinzki said he had seen an operation in Professor Sibeleau's clinic in Paris for a growth of this kind located in the sublingual space and projecting into the mouth. Sibeleau, who made the diagnosis, said that in all probability it was a dermoid cyst. The patient was a girl aged ten or twelve years, and the doctor thought these things were not uncommon. He made an incision below the inferior maxillary, in the median line, and shelled out a tumor the size of a small orange. He stated that hair or teeth were very rarely found in these dermoids. When the cyst was opened it was found to be filled with a sebaceous mass. The diagnosis was made by the history and palpation and the professor stated that he had had a number of similar cases.

Dr. Sonnenschein said in regard to the embryologic question that he had stated in the paper that it was the inclusion of ectodermal cells which produced dermoids. Where these developed in the cervical region of the fetus, they might descend into the chest, just as the heart and the laryngeal nerve were carried down. The growths might lodge anywhere in the thorax, between the heart and lung, or in the hilum of the lung, etc. It was true that the other organs in the chest were mesodermal.

In regard to the growth mentioned by Dr. von Zelinzki, it was true that dermoid growths might occur in any rgion of the body, but the most frequent place, according to the observations, was in the ovary.

Paper: The Lingual Duct in the Production of Paroxysmal Cough.*

By T. W. LEWIS, M. D.

DISCUSSION.

Dr. Robert Sonnenschein said he had never looked at the thyroglossal duct in this connection, and thought Dr. Lewis had been of much service in calling attention to this. The lingual tonsil, he was sure, was responsible for many coughs, and many cases had yielded to cauterization with the galvanocautery.

Dr. Lewis had felt rather chagrined when he encountered the first case not to know that there was such a thing as a lingual duct. When he found pus exuding from the base of the tongue and could not account for it. When the man with him, one of the best known men in the country, could not give him any light on the subject, and when he inquired of most of his friends and found that none of them could tell him the source of it, he felt that he was, perhaps, not alone in his ignorance. When he investigated and found practically nothing written on the subject of the lingual duct, he thought it might be a subject worthy of bringing before the society. If he had called attention to something that had been neglected or overlooked, or something that would promote investigation, perhaps someone would be able to see something more than he had seen.

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*See page 422.

Dr. Joseph Beck presented two brains showing

Tumor and Abscess.

The first patient was a woman aged 29 years who had been referred by Dr. Harry Gradle for operation for accessory sinus involvement. The patient, when referred to Dr. Beck, was rapidly losing her vision and Dr. Gradle had found nothing to account for this except a very large blind spot which was supposed to be of retrobulbar origin. She had been operated for goiter by Dr. Crile and had recovered except for the exophthalmos, which was very marked. Vision was reduced to 1/200 in both eyes. Examination revealed no evidence of sinus involvement except slight crowding of the ethmoid. A bilateral ethmoid operation was performed, the region being opened wide, and nothing particularly abnormal was found. Following this there was considerable improvement in vision for large objects, but in tests made for acuity of vision at a distance there was not much change. Aside from examination for sinus involvement nothing further was done. The patient gave a history of some noise in the right ear several years previously, but functional test was not made. There was no mention of headache and a slight unsteadiness of gait was the only sign of brain disturbance. The patient left the city and returned after six weeks. At this time there was a typical choked disc of nearly seven diopters and symptoms of brain tumor. Functional tests for the brain stem and vestibular apparatus revealed an absolutely dead ear; otherwise, normal in every way. A neurologist was called in consultation and made a diagnosis of retrolabyrynthine tumor, or tumor of the acousticus. Because of the choked disc and ataxic gait operation was decided upon. The cerebellar region was exposed bilaterally, slightly more to the right. The patient was turned with the face down so that the anesthetic could be administered from below. When turning the patient upon the abdomen the breathing became shallow; she was immediately placed again on her back and recovered normal respiration. After she recoverd she was again placed face down and a large flap was removed from the region they wished to explore. There was considerable hemorrhage and when the bony flap was removed the patient stopped breathing again and attempts at resuscitation were of no avail.

Permission was obtained for an immediate postmortem and in the region of the cerebellum there was an apparently free tumor, with a well-defined capsule, located in the region of the pons and medulla near the vital center. The patient had never mentioned the fact that she could not lie on one side without disturbance, but the husband stated that she had told him that this was the case.

The second specimen was the brain of a young woman, 28 years old, married and the mother of two healthy children. She gave a history of having had a suppurating ear for a number of years during childhood. Three years previous to examination she had an acute suppuration of the ear from which she never recovered. In June, 1919, she developed pain in the hear and a great deal of dizziness and vertigo. When the patient was brought to Dr. Beck by Dr. Novak it was decided that she had a localized labyrinthitis in connection with a chronic suppurating ear, and as the symptoms were so acute it was decided to postpone operation for a time. After two weeks Dr. Novak thought the patient had a cerebellar abscess and operation was decided upon. The usual operation was performed and the abscess was very readily located in the region of the under surface of the cerebellum in the region of the sinus. It was opened and drained and very foul pus escaped. Bactericlogic examination showed a fusiform bacillus. A drain was inserted and after about a week the patient was able to get up and was getting along well. About ten days after the operation the drain was removed; there was no further discharge but at the place of drainage a small projection appeared and rapidly increased in size until it was as large as a small apple. As this hernia increased in size very violent headache developed. An attempt was made to replace the hernia, but this produced grave symptoms and it was decided to amputate it. This was done and the patient had considerable relief from symptoms, and then a sort of sac was formed and following this a fistula appeared which was thought to be a cerebrospinal fistula, and the patient grew gradually worse. She deteriorated mentally and gradually refused food until feeding had to be forced. This condition persisted until she became comatose and died on the 2nd of November. An immediate postmortem was performed at six-thirty A. M. Two days before the patient's death Dr. Carpenter was in the city and assisted Dr. Pollock in reopening the wound at the site of the hernia, but nothing unusual was found but the hernial sac. Postmortem revealed an apparently normal brain with slight edema at the pons and a collapsed abscess, with the wall not as thick as a chronic abscess usually shows. When the temporal bone was removed they discovered on the posterior surface of the bone a fistula from the posterior semicircular canal. Stereoscopic radiogram of this temporal bone showed that the labyrinth was involved in a destructive labyrinthitis.

Histologic examination would be reported on subsequently. The patient showed a vertical nystagmus and he and Dr. Carpenter had decided that there must be some intracranial condition. The details of the tests and other examination would be reported fully at a later date, when the case would be reported in full. Today he wished simply to present two fresh specimens of brains operated upon.

DISCUSSION.

Dr. C. M. Robertson was of the opinion that Dr. Beck should report fully on the vestibular reaction, and asked if the pontine angle tumor had reached a size that would interfere with the opposite side sufficiently to eliminate the other labyrinth.

He also asked if, when the hernia was removed in the second case, a part of the cerebellum was also taken away, and whether any peculiar symptoms followed the amputation—whether there was anything in the way of spasms exhibited.

Earlier in his career he was called in to give an anesthetic to a patient who was undergoing an operation for a congenital cerebellar hernia. The operator cut off about one-half of the lobe of the cerebellum, which produced a very decided train of spasms even under the anesthesia. The congenital hernia of the cerebellum was at least eight or ten centimeters in diameter. The child lived for two or three months following operation, but was unable to control its motions.

Dr. Robert Sonnenschein asked whether an X-ray had been taken in the first case to determine the condition of the auditory meatus.

Also, was it not true, in regard to the second case, that with the exception of a few centers, most of the cerebellum could be removed with safety? They were apparently silent areas and their removal would not produce marked symptoms.

Dr. J. Holinger, with the idea of adding a point to the difficulty of diagnosis in these cases, cited a case operated at the Cook County Hospital. The patient was a child who was first seen in an unconscious condition with a badly suppurating ear. Examination of the ear showed granulations and foul smelling pus filling the canal. This condition had been present for some time before the patient was referred to the otolaryngologic department. Operation was performed more with the intention of giving the child a last chance than a distinct expectation of cure. Extensive masses of necrosed bone were removed. The child rallied somewhat, asked for water and recognized its mother. A week later she became worse, and in his absence Dr. Meyer, under the impression that there was a soft spot in the bone which gave a typical parchment feeling, thought there was something to be found and entered the skull further back than the point of previous operation. He found nothing. The child died two days afterward.

A postmortem was obtained and showed an enormous brain tumor. There had been no symptoms to make one suspect anything of the kind. Examination of the brain showed the entire mass so completely out of its shape that it was almost impossible to recognize the different parts. There was a tumor at least the size of a small orange, which had pressed the pons and medulla and cerebellum entirely to one side. The medulla was not as thick as a lead pencil. The tumor took the place of one hemisphere of the cerebellum, and even the temporal lobe was pushed entirely to the front. That a tumor of that size could squeeze the parts so far out of place without producing symptoms was remarkable. The child had played and appeared normal up to ten days before entering the hospital. Questioning elicited the fact that she had been in the hospital for influenza several months previous, but had recovered and was all right until she was brought in again for treatment for the ear condition. She became unconscious in the hospital.

Dr. Michael Goldenburg was reminded of a case that came under his observation six or eight months ago. A child was brought to the infirmary at the suggestion of the family physician to have its tonsils and adenoids removed. This was accomplished with nothing unusual developing. A few days later the mother brought the child back, stating that he had been blind since the operation. A fundus examination revealed a double papilloedema. On going into the history carefully a diagnosis of brain tumor was made. This was later confirmed by a neurologist and the following morning a subtemporal decompression was performed. The tumor was, however, deep seated and nothing could be accomplished.

Dr. Beck (closing) said that all the examinations and tests had been made and would be reported on fully at a later date. As Dr. Cushing said, the tumor in such cases enlarged the internal auditory canal, but there was no information to be obtained at that point in this case.

In the second case there were no peculiar symptoms following amputation of the hernia. Quite a portion of the cerebellum was removed, but there were no symptoms. If she could have been made to walk she might have exhibited symptoms, but as she was bedfast nothing was shown that could be referred to the operation.

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LVI.

THE POSSIBILITIES OF CURING ADVANCED LARYNGEAL TUBERCULOSIS.*

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NEW YORK.

The subject which we are to discuss this evening is such a broad one that you will permit me to take up only a few of the salient points—in other words, the problem of combatting certain of the most distressing and serious symptoms of laryngeal tuberculosis. To start with, let me remind you that not more than perhaps twenty-five years ago even some laryngologists discussed the question whether or not it was worth while to treat patients afflicted with laryngeal tuberculosis. In my early days in the Montefiore Hospital one of the directors asked me in all seriousness: "Doctor, why do you not let these poor devils die without bothering them?"

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*Read before the American Laryngological, Rhinological and Otological Society at its annual meeting, held June 2, 3 and 4, 1920.

Well, in spite of this attitude we continued our efforts. Very soon I was able to publish from this same hospital an article in which I asserted the possibility of curing incipient laryngeal tuberculosis. That was after Hermann Krause, Heryng and Moritz Schmidt had come out with similar statements and a plea for energetic treatment in such cases.

Today I venture to say that it is possible to cure even advanced laryngeal tuberculosis, and in many cases independent of the condition of the lungs. I am well aware that Prof. Friedrich of Kiel expressed the general belief when he stated last year that advanced cases of laryngeal tuberculosis can be improved by local treatment, their curability, however, depending upon the gravity of the pulmonary lesions. Nevertheless, my experience with this disease extending over twenty-five years in the Montefiore Hospital alone, during which time I not only saw, but personally treated hundreds of cases annually, warrants my making such a statement. In order to prove my contention let us consider the three principal symptoms and the means nowadays at our disposal to combat them. They are: (1) Cough, (2) dysphagia and (3) stenosis of the larynx.

THE COUGH.

You know very well, gentlemen, that cough may originate in any part of the respiratory tract. As laryngologists it is certainly our duty to remove cough originating in the upper air tract, and it is in this connection that the work of the specialist may and should be of great prophylactic and curative value.

(a) Nasal Cough.—That nasal polypi, an affection seldom met with in tuberculosis, often cause a reflex cough is too well known to be discussed further. Their removal is easy and not complicated by great loss of blood.

Indirectly, cough may be caused by a deviated nasal septum —i. e., when secretions stagnate behind the deviation and then run down into the throat. If the general condition of the patient is at all satisfactory, he should be operated on under cocain and adrenalin (no general anesthesia). I recollect a young man whose septum was extremely deflected. The operation not only gave him nasal breathing, but also ventilation of the affected side of the lung, so that within a few months he gained twenty pounds and left the institution in a much improved condition.

In the case of accessory sinus affection, minor operations may be attempted, if general conditions permit and if there is a good chance of thus curing the sinus trouble. But one should hesitate very much before attempting a radical operation, as for example, on the frontal sinus, etc.

(b) The Pharyngeal Cough.—This is by far the most important cough from a prophylactic as well as a curative point of view. If the internist would only pay more attention to the details set forth here, the percentage of cured pulmonary cases would increase materially.

It is in the pharynx that the most frequent source of a cough is found, and one that can be removed easily in the majority of cases by regular topical applications. We find here postnasal catarrh, with its sticky, tenacious secretion, often originating in the accessory sinuses, and also granulations and diseased tonsils. In catarrhal cases mild applications several times a week will positively remove the cough. These are the typical cases, where characteristic hacking cough is found, and with but a few slight rales over the lungs. Nobody could ever convince me that these few rales have any connection with the cough. Morphin will do great harm in this stage, but rational treatment of the pharynx will eliminate the great danger of a permanent cough.

The treatment of a granular pharyngitis offers no special difficulties, but how about tonsils? The writer has warned against the indiscriminate removal of tonsils in general,[1] and here he wishes to protest strongly against operations on them in tuberculous patients. In incipient cases and in young children, when the tonsils may cause difficulty in respiration, they may be removed. But when this is not the case and the tonsils are only chronically affected, with or without cheesy matter in their crypts, their removal is contraindicated. I know of too many cases that "went wrong" after tonsillectomy that I should ignore them. Patients coming into a tuberculosis ward nowadays seldom have any tonsils left. Three examples will serve to illustrate this.

Case 1.—Mrs. ———, a woman with advanced pulmonary and laryngeal tuberculosis and marked dysphagia, had been treated by me with the result that she could swallow food, something she had not been able to do for a long time previously. I sent her to the country, and her physician at once transferred her to a hospital for tonsillectomy. Soon I received a telegram from her husband: "Tonsils removed successfully." Three days later she was dead—hemorrhage from the lungs.

Case 2.—Miss F., a delicate young woman, suffering from mild laryngeal and pulmonary tuberculosis, was referred by me to a laryngologist in the South. He discovered "big" tonsils and removed them without consulting me. This, too, was done "successfully." Within four weeks, however, a new eruption of miliary tubercles appeared in the pharynx, and such "secondary eruptions invariably give a bad prognosis," the doctor wrote. A few months later she was dead. I do not affirm that she would not have died within that period, but I am strongly inclined to believe that she would have had a greater chance to recover if tonsillectomy had been avoided, and that the secondary eruption was directly the result of the operation.

Case 3.—Miss G. was treated by me on and off for recurrent laryngitis. I examined her frequently and always found the same suspicious area over the left lung, without, however, being able to make a positive diagnosis of tuberculosis. During the summer months she invariably went to the mountains or the seashore, and kept quite well with the aid of a little occasional treatment. Finally she consulted another physician and out came her tonsils. Exactly two months afterwards she returned to me with distinct signs of tuberculosis over both lungs. Her larynx was also affected: interarytenoid edematous swelling and ulcer on the left vocal cord. About four weeks later a miliary eruption appeared all over the right tonsillar region that showed thick tuberculous infiltration. Both conditions are rapidly progressing, and there is little hope of her recovery. (She has died since.)

Such cases make one doubt the wisdom of tonsillectomy and advocate conservative means for the treatment of diseased tonsils.

The hypertrophied lingual tonsil, which is encountered so very frequently in the tuberculous, is best treated by the galvanocautery method. The same applies to enlarged veins at the base of the tongue, which not infrequently are the only source of a "pulmonary" hemorrhage.

The cough due to pathologic conditions in the larynx and trachea will best be dealt with in connection with the second symptom under consideration, viz.:

DYSPHAGIA.

Much more important than the relief of cough is the difficult task of ameliorating or entirely removing dysphagia. On this point hinges the success or failure of the treatment, the life or death of the patient. That, according to my estimate, holds good for about 80 per cent of the advanced laryngeal cases.

Since the cure of general tuberculosis is largely a matter of dietetics, this becomes illusory when the patient has difficulty in swallowing, a symptom that increases in gravity pari passu with the advance of the laryngeal lesion. The nearer the latter is located to the entrance of the larynx the greater the pain. There is an elastic ring that comprises the epiglottis, the ventricular bands, the plicæ aryepiglotticæ and the arytenoids, and this ring, as is well known, contracts each time food passes over the entrance of the larynx and explains the pain during eating.

What, then, are the means to combat this symptom? Although dysphagia is generally the sign of advanced laryngeal tuberculosis, one ought to begin the treatment of the larynx at a very early stage if future trouble is to be avoided. Prophylaxis is the watchword here, and for that reason one ought to begin in the pretuberculous period, if such a thing were always possible. In these early stages one finds two conditions: a simple inflammatory laryngitis, and one that is nothing else but a continuance of a rhinopharyngeal catarrh. I agree here with Dr. Jiménez Encinas[2], of Madrid, in what he says about prophylactic measures and could add a good deal, if space permitted.

But it is in this socalled pretuberculous stage when the work of the "laryngoiater" is of importance also in discovering latent and I must add primary laryngeal tuberculosis. (I found the word "laryngoiater" in an article by Poli of Genoa; most likely it is similar to our word pediater, etc.)

As to latent tuberculosis of the larynx, the writer encountered quite a number of such cases, and it so happened that a differential diagnosis had always to be established between carcinoma, lues and tuberculosis.

Case.—Mr. J. L. W., aged 30, consulted me on February 16, 1917, on the advice of a laryngologist of this city. He had been hoarse for the last eight months; had slight pain in the throat, but never any disphagia, denied any specific infection and had lost considerably in weight. Wassermann as well as sputum examination, both repeatedly done, were always negative. Larngeal examination revealed the following:

The epiglottis was punched out and showed scar tissue, evidently from former ulcerations. The left ventricular band was very much thickened (infiltrated), and on the same side anteriorly in the subglottic space there was also a small mass, apparently likewise a tuberculous infiltration. The right side could not be seen, as it was covered partly by the overhanging epiglottis and partly by the enlarged arytenoid (marked perichondritis). There was a mild stenosis of the larynx. At first I was inclined to consider this case as a mixed infection—the epiglottis especially looked like an old luetic infection, while the other parts appeared to be tuberculous—but after a while signs of pulmonary tuberculosis were recognized and the patient treated as such. By and by the epiglottic infiltration on the left side became smaller and the vocal cord was seen to be immobile. Under ordinary treatment patient improved to such an extent that he gained more than thirty pounds and felt perfectly well—that is, with the exception of the hoarseness. He had had no antisyphilitic treatment and the case was considered as one of latent laryngeal tuberculosis.

In other instances there may be a grave doubt in the mind of the most experienced laryngologist whether he has to deal with cancer or tuberculosis. Very rare are those cases in which evidence of both diseases or of cancer and lues is found or finally all three diseases combined. Of the last mentioned category the writer only lately saw a case in consultation with a Newark colleague. As to the presence of luetic affection of the larynx, one should always bear in mind the possibility of pulmonary syphilis. As has been pointed out, it is not generally known that a premonitory bleeding from the lungs through a syphilide of its mucosa may and does occur. Thus a pulmonary hemorrhage with doubtful or slight signs over the lungs may mislead one to make a diagnosis of tuberculosis, while in reality it is a case of syphilis. A Wassermann test does not always clear up the situation.

As to primary tuberculosis of the larynx, the writer has demonstrated many such cases before medical societies during the last ten years. Here, too, occasionally a differential diagnosis has to be established. But when the laryngeal image is positively indicative of tuberculosis the patient must be treated accordingly, no matter what may be the verdict of the internist in regard to the lungs. In order to make this point perfectly clear, the writer would refer to the following instance: A case belonging to this class was presented by me to a medical society, when a well known phthiseotherapist got up and remarked approximately thus: "In such cases you are invariably able to show lesions in the lungs, and when you do not find any, it is positively not tuberculosis." I felt constrained to remind him of a case, in which I had made the diagnosis of primary laryngeal tuberculosis and which he himself had examined every four weeks. It was not until eight months later that he also found pulmonary lesions. This does not militate against his ability as a diagnostician. For how can anyone find tuberculosis if there is none? It does speak in favor of the theory of primary tuberculosis of the larynx.

A case similar to mine is published by Dr. J. Encinas (loc. cit., p. 251) in extenso. He adds that he has records of ten more such observations in his own practice. In all these cases the diagnosis of tuberculosis was verified by the internist a long time after it had been established by the laryngologist. All this only goes to prove that laryngologists have to believe in what they see. This is true of carcinoma and it is just as applicable to tuberculosis. Parenthetically it should be added that temperature, pulse and respiration never gave any evidence of the disease in Dr. Encinas' nor in my cases.

That tuberculosis may manifest itself exclusively in the larynx should not be surprising, since "local" tuberculosis is frequently observed in other organs as well, for example, the kidneys, etc. But even in our own specialty such cases are not unknown. Primary affections of the soft and hard palate, the pillars and the tongue have been noticed by a number of colleagues, as evidenced by a discussion in the Academia médico-chirurgica española (Revista española de laryngologia, p. 224, 119). Dr. Ledete has also described a convincing case of primary tuberculosis of the tongue (p. 235, ibidem). Fein of Vienna demonstrated before the Vienna Laryngological Society a case of primary tuberculosis of the pharyngeal tonsil. In the discussion that followed, by the way, Doctors Tschiassny and Hofer reported bad results after tonsillectomy in such cases. (Internat. Centralblatt für Laryng., p. 73, 1920.)

The cases cited and many others seen during the last twenty-five or thirty years have demonstrated to the writer the clinical evidence of a primary or local tuberculosis of the larynx (and pharynx); nor is he inclined to change his views in spite of Prof. Orth's opinion to the contrary. This illustrious pathologist of Berlin, who has devoted fifty years of his life to the study of tuberculosis, is very much astonished that some laryngologists still believe in a primary laryngeal tuberculosis. With all due respect to this great authority, it is my conviction that such cases not only occur, but occur more frequently than we ever believed they did. Of course, nobody can prove that there is not a small area somewhere in the lungs that could not be diagnosticated in any of these cases. But when we see that the larynx is positively tuberculous and that such lesions get well occasionally without being followed by a pulmonary affection, then we have to believe that Orth is correct when he states that an invasion of tubercle bacilli into the body does not necessarily mean an infection. (Berliner klin. Woch., p. 76, 1920.)

Permit me to add here a few words in regard to the origin of tuberculosis in the larynx. Many theories have been brought forward, the oldest and most important one being that by Louis, known generally as the theory of sputum infection. This was later taken up by the Schottelius of Freiburg, who ingeniously gave it what may be termed a mechanical basis. According to Schottelius, the musculus interarytenoideus transversus is an important factor in the pathology of the larynx, especially in tuberculosis. Its contraction presses the blood into the large vessels of the submucosa and mucosa, which normally is folded at the posterior wall. A cough from any source, especially prolonged cough, will cause a hyperemia, followed by a thickening of the folds of the mucosa. Then the secretions will stagnate here and be decomposed. Thus an ulceration will be produced that may or may not be of tuberculous nature.

This theory will explain the origin of laryngeal tuberculosis in some cases, but not in all, and surely not that of primary laryngeal tuberculosis. In these the hematogenous or lymphogenous mode of infection is the prevalent one.[3] The latter road—i. e., by way of the lymphatics, is especially plausible, if the retropharynx is taken into consideration. Those who have read the writer's article on the etiology of pulmonary tuberculosis[4] will remember that the postnasal space, the vault of the pharynx, was considered the locus minimæ resistentiæ, the place through which in many instances the tubercle bacillus finds entrance into the system, an opinion corroborated by years of observation afterwards. This holds good, not only for tuberculosis, but for many other infections as well. I need mention only cerebrospinal meningitis, influenza, etc. During the last epidemic of influenza a system of keeping or making the nasopharynx "sterile" was devised, a most sensible measure, if carefully carried out. The rapidity of absorption of toxins from the posterior nares and nasopharynx is easily explained by the abundance of lymphatics, the scarcity of protecting connective tissues and finally by the extraordinarily great frequency of a postnasal catarrh. Thus it is a well known fact that in nasopharyngeal diphtheria, for example, the danger is from toxemia. This danger is much less when the tonsils are affected, even when they show abundant membranes.[5] Now if we consider, as the writer has always done, that the nasopharynx is the most important gateway for the entrance of tubercle bacillus, it is not difficult to understand how primary tuberculosis of the larynx can be produced by way of the lymphatics. It is surprising that it does not occur more frequently.

But be this as it may, one thing is sure: Once tuberculosis has invaded the larynx prompt therapy is of importance and to begin with especially that of the interarytenoid space. Early energetic treatment will do a great deal not only towards alleviating and curing the early manifestations, as cough, etc., but also towards preventing the secondary and tertiary destruction so often met with.

A case of this kind is that of Mrs. P. G. She had an interarytenoid thickening that was treated with nitrate of silver and then zinc chlorid solution up to 15 per cent. There always were and still are present slight irregularities of the left vocal cord, but the process is stationary, without giving any symptoms excepting slight huskiness of the voice. The interarytenoid space appears normal now and the cough has disappeared.

As long as the surface of the larynx is intact, the case is generally of a simpler character, and we are justified in giving a somewhat hopeful prognosis. Spontaneous cures at this stage occur not infrequently. With the appearance of ulcers, however, the portals are opened wide for a pernicious secondary infection and pari passu for many troubles to the patient.

We must consider, therefore, that class of cases which present ulcerative processes in the larynx and so frequently are attended with dysphagia. It is here that so much progress has been made, a fact so encouraging to every worker in this field of medicine. The treatment can best be described by citing illustrative cases. Mrs. Mary D., both lungs affected, showed ulcerations of a mild character on both vocal cords, causing only slight dysphagia. She was treated with applications of tannic acid, chlorid of zinc, and finally argyrol three times a week, with the result that the ulcers healed entirely and have not given her any trouble for the past four months.

Such mild cases are unfortunately not the rule. But if every case of pulmonary tuberculosis were examined intralaryngeally, many such instances would be found, where the patient does not complain much about his larynx, but believes that any irritation there is only caused by his pulmonary troubles. Treatment started right then, and there will be of great prophylactic benefit to the patient.

The more advanced cases show an abundance of ulcerations which often are combined with tuberculous infiltrations, perichondritis of the arytenoids, epiglottis, etc., and in the majority of instances are dreaded because of excruciating pain occurring mainly during the act of swallowing. What is needed here is not cocain, an anesthetic of short duration, but a prolonged analgesic of the larynx, that will put that organ at rest for days, relieve the pain and cough, thus giving nature a chance to heal the progressing laryngeal condition. Remember that the best table d'hote dinner is of no value to him who cannot swallow a morsel of food, nor a drop of water in spite of the greatest hunger and thirst. Thousands of such poor creatures are perishing every year from mere starvation.

To relieve this condition many drugs have been tried. You may use anything that in your opinion will do some good to your patient. But the remedy par excellence to be employed here is orthoform. If the patient is benefited by any other means, nothing further need be said. Anything that relieves the pain will serve the purpose. But if this is not the case and a patient is allowed to suffer from marked dysphagia for weeks or months, the physician commits a great injustice if he does not resort to orthoform. This drug has done so much good in my hands that I cannot help placing it on top of the list in all ulcerative, painful processes of the larynx. It is generally applied in an emulsion, the formula of which I published before, but which may be added here:

℞	Menthol	0.6 to 6.0
	Formaldehyd	0.6
	Orthoform	6.0
	Ol. amygdal. dulc.	15.0
	Pulv. acaciae	15.0
	Aquæ ad	60.0
	M. f. emulsio	

Unfortunately, orthoform is no longer available in this country. (Since there is peace now, let us hope that we may obtain it soon again.) A peculiar coincidence happened in the hospital. At one time there was quite a "run" on the emulsion among this class of patients. Almost everyone asked for it. Suddenly this stopped and the patients declared that the emulsion was of no benefit to them. The riddle was solved by one of my adjuncts, who found out that the druggist, being unable to procure orthoform, had substituted anesthesin for it. Undoubtedly anesthesin is of value in some cases, but not in the majority of this class.

Another drug recommended as an analgesic of prolonged action is propaesin. This acts much better than anesthesin, but its beneficial effect is seen in a smaller percentage of cases than where orthoform is used. I am constrained to make this statement, which conflicts somewhat with that made in a former publication. Such is my present experience, but is it possible that the war had something to do with the purity of the drug? I do not know. However, propaesin is an important drug which cannot be ignored.

Another medicine belonging to the orthoform group is cycloform, which chemically is isobutyl para-aminobenzoate. It was recommended several years ago by Albert Rosenberg of Berlin, and I was glad to secure a few ounces during the war at a time when it was impossible to obtain any of the other drugs. Cycloform, too, has analgesic properties which are of value. It may be given with coryfin (1:25 coryfin), but any other oil will do, if coryfin should be too strong for the patient. Let us consider several of my cases:

Mrs. ———, 42 years of age, had suffered a great deal from dysphagia. She received the orthoform emulsion twice a week and finally was able to swallow food with little difficulty. Her pulmonary condition, however, was getting worse, and mainly for that reason I sent her to a climatic resort. There she did not receive the orthoform treatment, although she begged the laryngologist for it, and what happened? She relapsed into her former state. After staying there several weeks she returned to New York in an exhausted condition. Right after the first treatment she could eat again. After a week, when she was in the status quo ante, she asked me: "Doctor, why did you send me away?" This case is not reported for any personal reason, but to demonstrate how slow some colleagues are in adopting new methods.

Entirely different was the course in another patient, Miss D. M. She had been suffering from ulcers over the right vocal cord and both arytenoids that caused severe dysphagia.

She was treated by a former assistant of mine according to the methods discussed here and began to improve. Then she came to my department of the hospital, where the treatment was simply continued. Although the larynx seems absolutely healed now, she still comes for treatment. The reason she gives is that she still has a slight irritation, not in the larynx, but in the trachea. This is always relieved by the injections of orthoform or propaesin. Her pulmonary condition has not improved, but she coughs very little, can eat well and generally feels much better than for a long time.

Another case is that of M. R., a laborer, 39 years of age, who consulted me in a desperate condition. It was the old story, heard so often: He had to support a family and was forced to work in spite of advanced laryngeal and pulmonary affection. The lungs were in the socalled second stage of the disease, while the larynx was marked by such destruction that it seemed almost impossible to do anything for him. His epiglottis was one mass of broken down tissue, the arytenoids were much enlarged by perichondritis. One deep ulcer was at the junction of the left vocal cord and arytenoid cartilage and a smaller one on the other side, etc. Owing to dysphagia he was so greatly weakened that he was a deplorable object. At once treatment was started. Cocain had to be applied first, as his larynx was so irritable that nothing would stay there. He was able to see me once a week only, and yet for six months not only was he kept alive but even gained somewhat in strength. The analgesia generally lasted for four to five days, so that he could take food during that time. In this case not only was orthoform used, but many other applications to be discussed later. At the end of six months he managed to go to the mountains, although still in a bad condition. For the greatest portion of the last half year he has been without pain.

Now I would like it to be understood that with the application of an analgesic but a small part of our work is done. Of course, such patients should receive general treatment, a proper diet and internal medication. Among the remedies which I favor especially are arsenic and calcium lactate, etc. But it is just as important that other parts of the respiratory tract be looked after. Sometimes the laryngeal affection is the sole cause of the cough. In most instances, however, there are other factors in the upper or lower air tract. If the nose and throat are cared for, as outlined above, and the patient still continues to cough, even after the application of orthoform, then the cause is to be found in the lower respiratory tract. In such cases morphin has to be given, eventually in big doses. The most important factor in the cure of the laryngeal condition as well as of the patient himself, is the healing of the ulcers. Now if the larynx is rendered quiescent by an analgesic and the patient still coughs, the ulcer will never heal. It is like pulling about a fractured limb instead of putting it in such a position that it cannot be moved. If, therefore, we succeed in quieting the larynx, when ulcers are present, nature will do the rest.

Since orthoform is not toxic, it may be used as often as the symptoms demand. That is, if the effect lasts a week, the remedy need not be applied more often. If its action lasts only a day, it should be used daily or even twice and three times a day. In addition morphin must be given whenever indicated. The writer is led to emphasize this point, since some fanatics would place all narcotic drugs on the prohibitive list. Prohibit alcohol, prohibit narcotics—one is just as bad as the other.

OTHER DRUGS.

It is natural that by applying analgesics or other agents it is the intention not merely to allay pain, but also to put these parts at rest so as to give nature a chance of healing the ulcers. If nature does that, she does it well. But if she is not inclined to help us, one has to resort to the drugs that were formerly in vogue exclusively. All kinds of astringents, caustics and antiseptics were recommended and later discarded. But since it has been the writer's experience that various drugs may have to be tried until one is found that does the work, the lesson was taken to heart never to give up the fight. Even after finding the right application it may lose its effect gradually, and you will have to resort to another, only to return to the former after weeks or months. It is wonderful how well one may succeed, if one is persistent enough. A few of these drugs may be mentioned here, just as they come to my mind: Alum, tannic acid, lead acetate, calcium phosphate have been applied in solution or powders. Then silver nitrate, zinc chlorid, caustic potash, lactic acid, iodoform with ether, sublimate, and last but not least formalin have been tried and frequently discarded. Some of these were claimed to be very effective and positive cures were reported. These cures were due not only to the attempt to change a septic ulcer into an aseptic one, but more so to the fact that through all these efforts laryngologists became more hopeful and paid more attention to the larynx and the general condition of the patient, thus achieving definite results.

One of the older remedies deserves special mention—that is, the balsam of Peru, a drug recommended long ago for tuberculous cases by the older Dr. Sayre, the well known orthopedic surgeon. Schnitzler of Vienna applied it to the larynx and speaks of it with great enthusiasm. It certainly works well in some cases, and the combination of balsam of Peru with collodium, as recommended by Schnitzler, is undoubtedly a good one. By this addition a protective covering is formed, under which superficial erosions heal readily, the secretions are diminished, and infiltrations become smaller. Even deeper ulcers soon show a tendency to clear up and improve. I prefer the following formula:

℞ Balsam. peruv..............................15.0
Olei menthæ
Collodii elast.
Alcohol, aa.................................... 5.–

This formula combines mild bactericidal properties with an effect that is gently irritating, at the same time producing cell proliferation, through which the therapeutic result is gained.

The last drug to be mentioned is pure carbolic acid for ulcerations in the larynx. It is applied directly without previous cocainization (Edward W. Collins) and has sometimes an excellent effect on these ulcers. Collins never saw edema following its application.

THE GALVANOCAUTERY.

If the ulcerations do not yield to mild treatment by astringents and analgesics, something more must be done. The electrocautery is a wonderful remedy in this respect. The ability to apply the cautery point to every nook and corner, and, as Rüedi has lately remarked, destroying the tuberculous foci thoroughly, is a great advantage over other methods. Besides the wound thus made is immediately closed up by a thick slough and any danger of a reinfection removed. The writer feels very enthusiastic concerning the galvanocautery method. To mention only one instance, I will state that at one time there were three patients at the hospital who begged for this treatment. In all of them the galvanocautery point was applied deep into the ulcers. Two of them left the hospital with the larynx cured, although there was little improvement in the lungs. Mermod of Lausanne has had excellent results with galvanocauterization in these cases, and I believe it was also Mermod who said that one should not cauterize "pour bruler," but to destroy as much tissue as possible.

Escat, on the other hand, declares that there are more contraindications to this method than indications. Among the former are: stenosis of the larynx, dysphagia and advanced pulmonary involvement. The writer fails to see the wisdom of the two last mentioned contraindications. Dysphagia is one of the very reasons for this application, and so, I am inclined to say, is advanced pulmonary tuberculosis. There is no danger of a new infection and hardly any loss of blood. Besides, in these desperate cases there is nothing to lose, anyway.

In spite of this, my enthusiasm, I cannot help feeling surprised at an article by Rüedi of Davos in connection with this method. Rüedi saw in six years 575 patients afflicted with laryngeal tuberculosis. In these 575 cases he performed 1,548 "operations" (i. e., electrocautery applications), an unusually high number, if one considers that only 59 of his cases were grave, according to his own statement.

Mechanical Dysphagia.—I agree with Rüedi, however, as to the use of this method also in closed infiltrations, as for example, edematous perichondritis. I believe it was Grünwald of Munich who first recommended the cautery, not only in ulcers but also in perichondritis. Those large arytenoids, for example, are frequently a cause of pain, the swelling alone being responsible for it. The old saying: tumor, dolor holds good here. By applying the cautery one is able in some instances to reduce the size of the cartilage and relieve the mechanical dysphagia due to the large size of the arytenoids.

It may be proper here to warn against being too bold in using the galvanocautery. A reactionary swelling and edema may set in and cause trouble. In Siebenmann's cases (66) this was so severe that twice tracheotomy had to be done and once intubation. One patient died in spite of the tracheotomy. This is the more remarkable since Siebenmann's method is nothing but a superficial cauterization, while Grünwald penetrates much more deeply with the galvanocautery point. The application of the cautery to the posterior commissure is best carried out under straight laryngoscopy. As W. Albrecht has shown, it is easier thus to judge about the extent of the process, etc. But with this method or any other a breaking down of the tissue will afterwards occur in some cases.

ALCOHOL INJECTIONS.

There are patients, and, I regret to say, many who are not relieved by any of these methods. For them injections of alcohol into the supralaryngeal nerve have been recommended as another means of affording relief. Since the writer has been repeatedly asked how these injections are made, he takes the liberty of briefly repeating what he said when injections of alcohol were mentioned for the first time in medical literature in this country.[6] Braun and Valentin injected cocain into the superior laryngeal nerve in order to produce anesthesia for endolaryngeal operations; but Hoffmann* of Munich was the first to employ alcohol injections for analgesia of long duration. The place where the superior laryngeal nerve penetrates the membrana thyrohyoidea can be felt with the finger from the outside. If the patient be placed on his back and the larynx pushed toward the affected side the most painful spot can be determined with the finger. Here the needle puncture is made in a direct vertical line to the body, a little more toward the outside. The needle is inserted to a depth of about 1½ cm., feeling meanwhile for the spot where the patient complains of the greatest pain, and here the alcohol is injected. Hoffmann recommends 85 per cent alcohol and of a temperature of 45° C., equal to about 112° F. The writer has used the same proportion.

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*The writer was shocked by the news that Rudolf Hoffmann, that gifted young colleague, was murdered in Munich on May 1, 1919, by an anarchistic mob just at the moment when he tried to bandage one of their wounded comrades in a street of that city.

After the subsidence of the initial pain, which is sometimes quite severe, another injection is immediately made. Hoffmann advises a strong and somewhat blunt needle, which is preferable, as it avoids the blood vessels and is less liable to break. In making injections with an ordinary hypodermic needle there is risk of its breaking, and it is a difficult matter, even at present, to extract a needle from the trachea or bronchi of a tuberculous patient. For this reason it is always best to employ a strong needle and to tell the patient neither to swallow nor to talk until the procedure has been completed.

It is not always easy to strike the nerve. The best proof that we have done so is the pain following the injection. If this is not complained of immediately, the result of the treatment is generally nil.

The advantages of this method are undoubtedly great, if compared to operative procedures. The injection is very simple and the analgesia lasts from a few hours to one week. The last, alas! is not the rule. A. Gignoux of Lyons is right when he tells us not to forget the unsuccessful cases.[7] For, after all, the injection must be made blindly, and one must rely a good deal on the patient's word. Consequently, sometimes the injection is too superficial or it is too deep, in which latter event a few drops of alcohol may enter the larynx, causing violent pain, or, according to Adolf Blumenthal of Berlin, alarming dyspnea; in neither instance is any benefit derived from the injection.

Bradt of Berlin not infrequently noticed edema of the arytenoids and aryepiglottic folds on the day of the injection or the day following.

However, the good results achieved occasionally warrant me in trying it in selected cases.

A measure that promises to give better results is

RESECTION OF THE SUPRALARYNGEAL NERVE.

By this method we can always reach the nerve, since we are able to see what we are doing. According to A. Gignoux of Lyon, the priority of employing this procedure belongs to Avellis of Frankfort a. M., who in 1909 reported one case operated on in this manner. In 1911 Blumenthal of Berlin published a technic for the resection of the supralaryngeal nerve (sc. its inner branch), and then came Moure and Celles of Bordeaux, Chalier and Bonnet, Liébault and Celles and others. It seems to be certain that the dysphagia always disappears after the resection. But the method is too new to warrant our passing an opinion. In addition, it should be mentioned that through the resulting lack of sensibility certain disagreeable symptoms develop after the resection. Of the two patients operated on by Gignoux one died four weeks after the operation from causes not mentioned. But the dysphagia had been eliminated! As this method, however, may prove of value in the future, it will be described here according to its modification by Chalier and Bonnet,[8] which seems to be preferable at present and which the writer has used in one case. An incision 3 cm. long is made, beginning 1 cm. outside of the median line and reaching to the middle of the space comprised by the cornu majus of the hyoid bone and the superior border of the thyroid cartilage. After incising the skin, etc., the fine fibers, which are the prolongation of the cervical aponeurosis, are cut through from within outwards on a grooved director. Thus one finds the thyrohyoid muscle at its upper insertion. Towards the outer border of this muscle there is found the superior branch of the laryngeal nerve, which is always situated above the superior laryngeal vessels about half way between the hyoid bone and thyroid cartilage. Without making any attempts at freeing the nerve, it is cut through, and in case of necessity the whole visible portion excised, both trunk and branches.

As mentioned above, the writer has operated on only one patient by this method, and he was too weak and too far gone to permit of an opinion as to its value.

Zencker in the *Münchener Med. Wochenschrift* (p. 1167, 1919) and in a personal communication to the writer, recommends this method, not only as the safest way of anesthetizing the larynx, but also as a curative measure.

As the treatment of tuberculosis of the larynx cannot be separated from that of the rest of the body, the use of the different rays must be considered here, not only because of their general effect, but also because most of them possess analgesic properties which are of some help in relieving dysphagia.

HELIOTHERAPY.

This, as just mentioned, is treatment by the actinic rays of the sun or by those of the electric light. As far as the sun is concerned, it is the simplest, the oldest and the most neglected therapeutic agent.

In the last decade of the past century so much had been written on this topic that as a result light therapy became the prevailing method of treatment in many a specialty of medicine. This is now almost forgotten. Although in this country the motto air and light, was the slogan for the tuberculous in every textbook and every pamphlet published, the great importance of sunlight itself as a curative factor has been greatly underestimated and neglected. Psychologically, this can be easily explained on account of the depressing effects of the sun during the greater part of the summer. People seek protection against its heat, forgetting that a beneficial effect from its rays can only be expected in a milder climate or a suitable locality (seashore, etc.).

The credit for demonstrating the healing power of sunlight belongs to Bernhard[9] and Rollier.[10] Bernhard was the first physician who made use of heliotherapy at his place in the Engadin in the treatment of tuberculosis of bones and joints. Before that he had successfully experimented with sun rays on torpid ulcers, seriously infected wounds, etc. Rollier treated exclusively tuberculosis of bones and joints at Leysin, where he had at his disposal a hospital of 500 beds. Of interest are also the experimental studies of the effect of sunlight upon the repair of fractures made by Harold Neuhof of New York. His results have an equally important bearing upon our theme, because they show that the healing power of the sun's rays is a general one on the body tissues. (Interstate Med. Jour., No. 8, 1917.) This statement is not contradicted by the observations of Léon Philipp,[11] who has never seen a complete cure of laryngeal tuberculosis by heliotherapy for the reason that the stay of patients at his sanatorium was limited and they were discharged too soon. On the other hand, he claims that the results obtained were favorable and would have been still better if heliotherapy had been combined with other therapeutic measures, as curetment, galvanocauterization, etc. As it was, in three cases of twenty-three the treatment had to be stopped on account of hemoptysis and mild edema of the larynx. In two cases he observed no improvement; in all others, however, a most favorable influence was noticed, especially of the subjective complaints, such as hoarseness and dysphagia. (See Intern. Centralblatt für Laryngologie, p. 210, 1917.) Of late P. F. Armand-Delille has used heliotherapy as a prophylactic measure in children whose mothers were suffering from tuberculosis. He established sunlight schools, the place for which was carefully selected every day. Morning and afternoon sessions were held, and the children were placed under good hygienic surroundings. As was to be expected, the results were excellent.

Without going into details of this prophylactic work, I feel there is one question supreme in the minds of thoughtful physicians: i. e.,—why do we permit healthy children to be sent to schools where they are bound to acquire all kinds of infections and where so many of them positively do contract tuberculosis? Life is more important than education. The efforts to establish open air schools are laudable and to be encouraged, but they are only the beginning of making the school safe for healthy pupils.

The effect of light (sunlight, diffuse daylight, electric light) on the organism has been studied from various points of view. Its bactericidal action is a factor not to be overlooked. But, as mentioned above, the most important one is the general effect on metabolism. It raises the power of resistance and with that alone a great deal is gained.

As physicians we should naturally be aware of the deleterious effects that direct sunlight may have on tuberculous patients and should guard them against accidents. The writer will never forget a socalled "sanitarium" he saw in one of the Western States, the director of which was a fantastic quack, who, ostensibly out of charity, took poor children from the slums of a large city to the hot climate in the West. He gave them all the sunlight possible and very inadequate food (of course, no medical treatment). I have never seen a more pitiable lot of children than those out there. This goes to show how far ignorance combined with fanaticism may lead. However, heliotherapy is a factor in treating tuberculosis that cannot be overlooked.

The laryngologist who attempts to treat laryngeal tuberculosis must be somewhat of an internist, and for that reason these general rules are discussed here. Local applications alone will seldom suffice; more is required. In many modern sanatoria heliotherapy is given in a room called the solarium. This makeshift—pleasant as it may be occasionally on a cold, sunny winter day—can never replace heliotherapy outdoors, as it ought to be used. The only correct way of application is by exposing the whole body naked to the rays, in other words, by taking sun baths. More about these later.

Now a word about raiment. Since man protects himself against the inclemency of the weather or for other reasons with garments, the rays of the sun cannot strike him directly. In order to determine the permeability of wearing materials, Boubnoff[12] used photographic paper and thus was enabled to judge the permeability of various garments from the findings on the paper. Undyed animal and vegetable threads allowed more chemical rays to penetrate than dyed ones. If, therefore, sunbaths are administered the body should be naked, or, if some covering is desired, it should consist of undyed thin goods.

Sunbaths in the open cannot be taken without exposure of the body at the same time to the prevailing atmosphere, thus combining heliotherapy with aerotherapy. The experience gained by these two methods is sufficient to convince everyone of their usefulness. They should replace a solarium. A modern sanatorium should have a special large space in the open for men and another for women, where they can exercise naked or clad very lightly in suitable weather. Very soon it will be noticed that almost any kind of weather is suitable. This treatment can be carried out at the seashore (thalassotherapy) or in the mountains (altotherapy, a word coined by the writer several years ago).

For many years I have sent a certain class of tuberculous patients to the seashore, especially those suffering from rhinitis or pharyngitis sicca or atrophicans. They were advised to take sea baths—that is, if they were strong enough to take a dip, come out, get dry in the sun and repeat the procedure. Where there is no water, the woods will be of benefit in taking sun baths, using the shade of the trees to cool off occasionally.

SEA TRIPS.

A further step in this direction are sea voyages. Although it is hardly to be expected that sea trips will be made use of under the present disturbed conditions everywhere, yet there is hope that peace on earth will be restored some time and there will be a revival of universal hygienic and therapeutic endeavors. Trips on the ocean are more important than a stay on or near the shore. Here on the Atlantic coast the air in summer is too often oppressive and debilitating to the patient. Too frequently there is hardly any air stirring, or when the wind blows from inland it brings with it mosquitoes and great discomfort. Things are different when cruising on the ocean in a slow going steamer or sailing vessel. Then there is almost always an air current and an absolutely pure and moist atmosphere so very refreshing for any weakened system.

A. Air Currents.—No matter in what climate a patient may be, a gentle, fresh breeze is always desirable. The writer has often observed patients in our western and southwestern states during the hot season, who would have been happy had they been able to get a breath of fresh air. As it was, they were simply prostrated by the heat. And this was in districts justly recommended and highly beneficial during cooler weather. While high winds and gales are certainly to be avoided, the idea that an absolutely even temperature and stillness of the air is required is just as wrong and pernicious. Let the patient have mild, fresh air and he will naturally breathe deeper without having to resort to gymnastics, which are not always without risk.

Besides, gentle breezes harden the system against inclemencies of the weather, have an invigorating influence on the nervous system and are apt to increase appetite and metabolism.

B. The Purity of the Atmosphere.—A discussion on this point seems superfluous. For what habitable region has an atmosphere as pure and aseptic as that of the ocean? Mountainous regions are very good, indeed, but in most of these places there is always more or less dust. Only on the highest peaks of some mountains are conditions more favorable, but few of our patients can avail themselves of these.

C. The Humidity of the Air.—Since the medical profession has been taught, at least for the last five decades, that only dry air is of benefit to the tuberculous, and as many of our climatic resorts appeal for support because of rival claims of one or one-half degree more or less dryness, this would show that humidity is often considered a contraindication. But remember that the rules for the consumptive have been laid down by the internist, often to the detriment of the patient. The laryngologist rarely bothered about general conditions and the patient was the loser. The indications for a moist atmosphere have been referred to above. Let me repeat here that a dry, hacking cough, a dry or atrophic rhinitis or pharyngitis and an ozenatous nasal or pharyngeal condition are absolute indications for a moist climate.

The chemical composition of sea air is a further beneficial factor for many patients. In laryngitis of a marked irritating character saline inhalations are often beneficial. On the ocean you inhale this salt air constantly. Besides there are other salts that get into the circulation by inhalation, viz., iodin and the bromids (sodium, potassium and ammonium bromids), and they, too, work well.

What class of patients will derive benefit from a sea voyage? The first requirement for such a patient must be his ability to resist seasickness. Anyone who cannot readily stand a trip on the water had better stay home. Furthermore, only incipient cases, and preferably those without expectoration, should be permitted to go on such a trip. If we ever reach the goal to have special boats equipped for the tuberculous, then even more advanced cases may be taken, provided there is competent medical aid on board and all hygienic regulations carried out to perfection. This is a dream for the future. A sea voyage will be of special benefit to those consumptives who have been overworked and have become nervous. The absolute rest and freedom from business cares on a boat will do more than a rest cure in any sanatorium.

It is self understood that suitable cruises will have to be selected and the trips varied according to season and other factors, as financial matters, etc.

RAREFIED MOUNTAIN AIR.

As to recommending the rarefied air of the mountains, one must be careful about the altitude, especially in advanced and cardiac cases. Some of these patients feel uncomfortable in the east, even at an altitude of 1,800 or 2,000 feet, and in the west at 5,000 or 6,000 feet elevation. Such people should gradually work their way up to the different altitudes or stay at lower levels. I know that crossing the Raton Pass on the road to the west has been detrimental to many a patient. Not long ago I had experience of this kind at another place, viz., Cloudcroft in New Mexico. While out west arrangements were made for me to go up there with a party, starting from a small place in New Mexico. Before going up to that most interesting and beautiful spot, which has an elevation of about 9,200 feet, I was asked by a young woman, who I knew suffered from laryngeal and pulmonary tuberculosis, whether she could join the party. I strongly advised against it, but received the answer: "Oh, well, last year I went up Pike's Peak and it did not hurt me; why should this?" All I could say was this: "If you know better, why do you ask?" A day after arriving on top of the mountain I was hastily called to that young woman. When I entered the room she had already succumbed to a pulmonary hemorrhage.

All this may be well known to most practitioners, but it is too often forgotten.

An important factor in the treatment by sun rays is

THE CLIMATE.

To answer the question what is the best and most suitable climate for cases of laryngeal tuberculosis, with or without pulmonary involvement, I would say: That climate is the best where a patient receives the most careful treatment by an experienced laryngologist. For, above all, our patients need local therapy—often a most difficult matter to obtain in the country. If this be secured, there is the choice between seashore and mountains—in other words, the choice of a proper climate. Here one should always remember that for many tuberculous patients climate is the decisive factor. We all know that many a patient is living and attending to his business at Denver, Colorado Springs, Liberty and a host of other places, who would have been dead long ago had he returned to some large city, where his home had been. Yet there are some physicians who try to deny this fact. All this holds good for laryngeal tuberculosis as well, although one has to be more careful with that class of cases. For example, many patients with laryngeal affections cannot stand high winds, while for others a low temperature is absolutely contraindicated. To a great extent we have to be guided here by the personal observation and feelings of the patient. When low temperature or high winds irritate any portion of the upper air tract, and the patient has to cough as a result of this, we know that such a locality is unsuitable. On the other hand, patients with laryngeal complications stand the air at sea level and on mountains just to about the same extent as other patients. High altitude in itself is not a contraindication for tuberculosis of the larynx.

Some medical men, among them those in high political positions, have begun to wage war against the centuries old experience that climate has a beneficial influence on tuberculosis. True enough, the practice of trying to get rid of a patient, who is practically dying from consumption, by sending him thousands of miles away, cannot be condemned too strongly. But nobody can deny the eternal truth that the rays of the winter sun in the south or west are different from those in the east, nor, for that matter, that the summer sun in Manhattan is not of the same benefit as that in the Catskills or Adirondacks. But summer or winter, the climate of Manhattan is different even from that of Coney Island, for example. The sun is different, and so is the purity of the air, the degree of humidity and everything else.

The trouble is that so far no strict indications have been laid down for the various climates and that the laryngologist has not been consulted on that question. According to my experience, there ought to be places in the city or vicinity where laryngeal cases in the incipient and terminal stages can be taken care of properly. The poor are provided for and so are the rich, but the middle classes are absolutely neglected. (To our discredit this must be said.)

If, then, we find a patient suffering from any dry condition of the upper air tract, we know that he needs a pure, moist atmosphere, which he can best secure at the seashore, or, for that matter, on the water (sea trips, etc.), but not in the city, especially not during winter.

The writer has shown elsewhere that at the end of the winter season the process of desiccation in the upper air tract is much more pronounced than at the beginning of the winter. This condition was found at the Montefiore Hospital Sanitarium at Bedford Hills, in the vicinity of New York City. Undoubtedly the same could be observed in other places, where on account of the cold weather patients cannot get the benefit of the open air all day and night. The mode of heating that has to be adopted in winter means desiccation of the upper air tract. Perhaps the lower respiratory organs are affected similarly at the same time. An excess of secretion does not necessarily exclude a dry mucosa.

But there is one more point to think of—i. e., the action of the tubercle bacillus in attracting humidity from the neighboring tissue and in later stages also from distant parts, thus directly desiccating them, or, as Drozda calls it, exsiccating. This process is one of the most important factors that prevents the loosening of the bacilli from within the lungs and their final elimination from the system. Thus from this general viewpoint, too, patients will often need a moist climate.

On the other hand, a great deal of secretion from the nose or throat or bronchi makes a dry climate imperative. The most suitable altitude has to be selected according to general rules. If in spite of careful consideration and selection of the proper resort the patient does not do well after a certain lapse of time, he ought to be transferred to another place, as nobody can say beforehand: this or that climate is the only one that will help you positively. For this reason a sanatorium for the tuberculous confined to only one locality seems to me antiquated. A proper sanatorium must be divided into three sections, placed in different localities: one at or near the city, another at the seashore and the third in the mountains. I repeat here for the thousandth time: There is no need for an expensive hospital equipment to care for the dubious or incipient (without expectoration) cases. They are not a menace to the community and can be taken care of elsewhere. But the great and constant need is for hospital care of laryngeal cases, especially the more advanced.

In this respect permit me to quote from a paper by Dr. Sherman G. Bonney[12] of Denver, Colo., who says: "It seems opportune to call attention to the limited scope of the sanatorium whose field of usefulness at present is not sufficiently broad to include the admission of advanced tuberculosis. Without desiring to detract in the least from the great utility of such institutions open to incipient pulmonary invalids, the fact remains that patients of this character do not, as a rule, constitute such a menace to society as the advanced cases and are rarily so ill as to demand that degree of personal supervision which necessitates residing under the same roof with a resident physician and corps of assistants. Many of these with proper industrial opportunities and in a suitable climate could easily become self supporting. While added opportunities for recovery are being offered to incipient cases, it is difficult to comprehend in what manner recent clinical effort has benefited the apparently hopeless or far advanced consumptive. He is denied admission to all sanatoria, because his condition is not such as to comply with requirements stipulated in their blanks of admission. He is persona non grata to all municipal hospitals. It might almost appear that these unfortunates may profit from the recent agitation concerning consumption only to the extent of receiving a few educational leaflets telling them where to expectorate, how their bed linen shall be disinfected, and how their apartments may be fumigated after death. He is privileged to be duly registered at headquarters, and to receive instructions from some responsible medical source, but he is forced to appreciate the fact that he constitutes at best a source of danger to his family. He is told in his educational leaflets 'to avoid the germs of consumption, to have a cheerful mind and a clear conscience, and to get an abundance of good food and good air,' yet he is denied by virtue of his very needs and requirements those advantages which are freely bestowed upon others less worthy upon the score of their actual needs, and who constitute elements of far less danger to the public."

Since it is known that the rays of the sun have analgesic as well as general properties in laryngitis dolorosa, other rays have been used in place of these in cases where the former were not always available, and we shall now discuss

THE TREATMENT WITH THE VARIOUS ELECTRIC RAYS.

A. Electric Light Therapy.—The beneficial results of treatment with the electric light are due to the action of those rays which most closely approximate the sunlight, viz., the blue and ultraviolet of the arc light. For particulars as to the action of these rays the writer would refer to his former publications on this subject.[13] In these papers were discussed not only the physiologic properties of these rays, but also their therapeutic effect. The question whether the rays of an electric arc lamp penetrate into the larynx is answered readily by the well known fact that we can see the interior of the larynx brilliantly illuminated when we place even a small lamp on the outside of it. (Translumination.)

Whether through any or all of these rays a bactericidal action is brought about or not, appears to me immaterial nowadays. Formerly that seemed to be important, but at present I can only say: What difference can it make as regards the final cure of the tuberculous process, if we really succeed in killing a few bacilli in the larynx, so long as they circulate in the blood? Of greater importance in our endeavor to cure the disease in the larynx became the aim to subdue the dysphagia. Once that battle is won, nature takes care of herself by producing normal conditions under favorable circumstances. In that respect electric light helped us occasionally. In all our cases it was applied only externally by means of the old Voltolini lamp for transillumination, as modified by the writer.

Other investigations have thought that they could get better results by using a system of mirrors for the purpose of reflecting the rays of the sun or the electric light directly upon or into the larynx. Thus Jos. Sorge of Davos and C. W. Miller, together with A. M. Foster of Colorado Springs, have employed various kinds of appliances and have reported good results. But it seems doubtful whether anything has been gained by these complicated methods. In difficult cases they are of no avail, and in milder ones they are not needed. The case reported by Blumenthal is of importance in this connection. He applied the rays every day for ten minutes to the larynx, which had been opened by laryngofissure, but without success. Although some benefit could have been reasonably expected, there was none. Of course, one case is not conclusive, but it certainly shows that these rays do not always cure, even when applied in the most direct way possible. This, of course, does not imply that we should give them up entirely. Indeed not, for in some instances they have been of benefit and have relieved the patients' sufferings to some extent, and they should be tried.

B. Fulguration.—This is applied either externally or intralaryngeally. In the first instance a larger electrode is used, and the spark gap may be changed easily to suit the case. For the intralaryngeal application of the high frequency current a long vacuum tube is employed curved so as to correspond with other laryngeal instruments. Here certain difficulties have to be overcome, as the irritability of the patient, etc. The sparks cannot be controlled as well and one has to be on the watch constantly.

All the sparks from this socalled brush discharge contain such an abundance of violet and ultraviolet rays, and their mild caustic effect is so evident that their application is indicated for several reasons. Their therapeutic effect is evidenced by some degree of analgesia as well as by a slow improvement in the ulcerative process.

STENOSIS OF THE LARYNX.

In this, the last chapter, only operative procedures will be discussed and mainly those that are necessary for the relief of a stenosis of the larynx and the trachea. According to the writer's experience, a stenosis is the only indication for operative work either within or without the larynx. But there is one more point we have learned through experience, and that is to avoid external operations in this class of cases as much as it is compatible with the patient's respiratory function. The disappointments in all operative work have very frequently been depressing, although occasionally encouraging results have been achieved. This holds good as long as the tuberculous process is still active. When it has come to a standstill, then the situation is altered as a rule and one is apt to get better results.

INTRALARYNGEAL OPERATIONS.

Speaking of the indications for various operative procedures it will be readily understood that there is nothing specific in the pharynx that would call for an operation in tuberculous patients except those conditions found in other persons as well and some others mentioned above. It is entirely different in the larynx. Here a great variety of pathologic conditions are found that cannot be removed except by an operation. To begin with the epiglottis: Tuberculous infiltrations of this normally small organ are not infrequently so enormous that the entrance to the larynx is entirely obscured and breathing becomes difficult. Very often there are ulcerations present in the regions below it which cannot be seen but can be surmised by the difficulty in deglutition. Naturally, such ulcers cannot be treated, and the patient loses constantly. In such instances the removal of the epiglottis is indicated. Once this amputation has been decided, there is only one ideal way of doing this, viz., by means of suspension laryngoscopy, the method originated by Gustav Killian of Berlin. In advanced cases more or less hemorrhage, sometimes a dangerous one, may be expected, but otherwise it is the procedure that enables us to work most quickly and with comparatively little discomfort to the patient. After the patient is once in the right position, the amputation of an epiglottis does not require minutes, but seconds. We have repeatedly had such experience and so undoubtedly have others. It makes little difference whether a big biting forceps is used or, as Arrowsmith prefers, a snare.

Infiltrations of the vocal cords or ventricular bands were removed extensively in former years. Nowadays, the writer does not operate on them, unless they have produced or have a tendency to produce laryngeal stenosis. That this can be done with the double curette of Krause or Heryng is beyond doubt, since the writer himself has done it so frequently. But for the removal of stalactite formations at the posterior commissure as well as for other more pronounced formations, especially when there are stenotic conditions present, suspension laryngoscopy is also the best method available. It is immaterial whether the galvanocautery is used or some cutting instrument or both combined.

It should be added that preferably all these patients should be operated on at a hospital or sanatorium, since a sudden tracheotomy may be required in any such case.

We now come to external operations, and, first of all, to

TRACHEOTOMY.

Moritz Schmidt recommended this operation as a prophylactic measure and he as well as a few others used it. The writer, although firmly believing in putting the affected organ at rest, never considered tracheotomy as the correct procedure and never employed it with that purpose in view. The only indication, in his opinion, was imminent or approaching stenosis of the larynx.

The prognosis of a tracheotomy is different according to the period in which it is performed. If a patient—I am tempted to say—is lucky enough to acquire a laryngeal stenosis in the early stage of pulmonary affection, then the prognosis is quite favorable. The outlook, however, is worse, if one is forced in the later stages of the disease or even when extreme necessity demands it. I have had patients in the first category who wore a canula for years with comfort after the pulmonary condition had healed and incidentally the laryngeal one as well. One patient, on whom I did a tracheotomy sixteen years ago, still wears it. His lungs are well. In the second class the results were disappointing in all but a few—that is, as far as an ultimate cure is concerned. Yet we have to resort to a tracheotomy whenever it is indicated. The question is: When is the right time to do it? When the attending laryngologist, after repeated examinations, sees that the lumen of the larynx is becoming smaller and smaller, and that there is a tendency on the part of the hostile forces to finally close it up entirely, then the sooner one operates the better for the patient. Naturally many persons will object to tracheotomy in spite of an outspoken dyspnea and may go about for many months. That makes the outlook only so much worse. For if one has to defer operation until the last moment the patient is so much run down by lack of oxygen and nourishment that the prognosis is bad right from the start. A few histories may illustrate some of our experiences.

Case 1.—This is the patient cited above. He lived eight months with marked dyspnea until he fell down one morning gasping for breath. He survived tracheotomy only a few months. His chances would have been far better if he had allowed us to operate when he was first advised to have it done.

Case 2.—This is a unique case. D. K., aet. 32, came to me with his father, a physician, seven years ago, complaining of hoarseness. Diagnosis at that time: Chronic laryngitis. Half a year later conditions were changed so that the diagnosis of primary laryngeal tuberculosis had to be made. The lungs were clinically sound; no tubercle bacilli in the sputum. Soon the right arytenoid showed such a degree of perichondritis that dyspnea set in. Patient disappeared and was not seen until seven years later. At that time the epiglottis was much enlarged and ulcerated on one side and the arytenoid had become so much extended that both together obscured the laryngeal image. Patient had been smoking cigarettes incessantly, had been out to cabarets, theaters, etc., almost nightly, yet he felt quite comfortable. At least that is what he told me. His dyspnea is now audible, there being a slight stridor noticeable. Not much dysphagia is complained of, but he feels "delightfully easy" after the propæsin emulsion is applied. He has not consulted a physician since he left me seven years ago. The lungs are affected now. Wassermann negative. A tracheotomy is "out of the question," says he. Yet after two weeks his condition grew so much worse that he gladly consented to it. The operation in this case was somewhat difficult, as the patient had great difficulty in lying on his back. But finally we succeeded in finishing the operation, the patient being left in good condition. He is still under treatment, but ever since the operation everything in the larynx is breaking down.

Case 3.—E. G., aet. 25, was brought into the hospital in a moribund condition when I happened to be present. Tracheotomy was done immediately without any preparation or anesthesia. He made such a good recovery that six months later he was discharged after his pulmonary affection had shrunk to a small area that was still diseased. He wore a tracheotomy tube two years longer. In the meanwhile scar tissue had formed in the larynx and trachea, the removal of which was unsuccessful under local anesthesia. Consequently this was done under ether and a perfect passage established between the trachea and the mouth. Patient felt great comfort thereafter until a few weeks later, while taking a short walk in the park, he was seized with a hemoptysis, to which he succumbed in a few minutes.

Case 4.—M. M. underwent an early tracheotomy on account of approaching stenosis. His lungs were in the socalled first stage of the disease. He was absolutely quiet during the operation, did not complain of pain once, lost a minimal amount of blood and was taken to his bed in excellent condition. As I told my assistants, this operation might have been called an ideal one. However, six hours later, hemoptysis set in, followed by exitus letalis. In this instance I had expected that the patient would get over the tracheotomy easily and that afterwards by laryngofissure all the diseased tissue could be removed. This was one of our disappointments.

Case 5.—Quite different was the result in the case of H. N., who was referred to me from a tuberculosis sanatorium on account of increasing throat trouble. On examination the epiglottis was found to be much infiltrated and edematous, the arytenoids were large with marked edema and hardly moved at all. Only a small portion of the vocal cords could be seen. There was slight dyspnea. In this case it would not have been safe to apply the galvanocautery point to the arytenoids, since a fresh edema would have closed the larynx entirely. The lungs were only mildly affected. Consequently a tracheotomy was done, from which the patient recovered in a short time. After that it appeared safe to amputate the epiglottis, which we did, and after a long interval of about six months, during which time the patient had been in the mountains, the galvanocautery was applied. Patient again left for the country, and on his return the larynx had improved to such a degree that the canula was discarded. This very exceptional and most encouraging case shows that in some instances a cure can be achieved, even under great difficulties. Our results ought to get better from year to year.

We now come to the question of laryngotomy and partial as well as total laryngectomy. At present one might expect good results from any of these operations in selected cases, when the operation is done at a very early stage of pulmonary tuberculosis—in other words, almost exclusively in primary laryngeal tuberculosis. The writer is inclined to believe that shortly the time will come when at least laryngotomy will be employed in any case of incipient laryngeal tuberculosis. Would it really be unwise, as some believe, to open up the larynx and remove every particle of diseased tissue at an early period? Surgically, this ought to constitute the most rational procedure, but would it also prove to be the most successful?

The effect of any therapeutic measure cannot be judged in a few weeks or months. A positive opinion in a chronic disease like tuberculosis can only be reached after watching a patient for a long period. Of course, in the case of dysphagia immediate results count for a great deal, as they render it possible for the patient to take food, gain in weight, become more hopeful, and may effect a change of the entire metabolism, etc. Later on, in the treatment of dysphagia, as in all other cases, only final results will count and stand the test of time.

By weighing carefully every measure or every drug recommended one will be successful in numerous instances. But do not forget that the reaction following any treatment or any operative procedure varies so greatly in different patients that one cannot lay down positive rules for all. The same treatment that will effect improvement or a cure in one case, in spite of the pulmonary condition getting worse or remaining stationary, will be followed by another by an aggravation of the symptoms or even by death. But by all means do something for your patients. Do not let them die with your hands folded. Results will crown your work if you try your utmost to help your patients. Rational activity with the aid of the means discussed in this paper will help you a great deal.

CONCLUSIONS.

1. Primary tuberculosis of the larynx does occur, and more frequently than has hitherto been accepted.

2. The prognosis of an established tuberculosis of the upper air passages is better than it used to be years ago.

3. All patients suffering from pulmonary tuberculosis should be advised to undergo a laryngologic examination, not only when the disease is diagnosed or on entering a sanatorium, but also at regular intervals, irrespective of their complaints.

4. The means at our disposal for the treatment of such patients are numerous and should be used.

5. Success depends largely upon untiring, conscientious and arduous work on the part of the attending laryngologist as well as on that of his assistants in case of sanatorium treatment.

6. Whenever the larynx is affected, such a patient should be under the supervision of a laryngologist, who is to take care of his lungs as well, and not under the direction of an internist, who very frequently does not even pretend to know anything about the larynx. In other words, the laryngologist should direct the general as well as the special treatment in all cases with laryngeal involvement.

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LVII.

AN UNUSUAL TYPE OF NASAL TUBERCULOSIS.

By George E. Shambaugh, M. D.,

Chicago.

Tuberculosis of the nasal cavities is a rather rare condition. It has been recognized clinically in two more or less distinct forms. In the one, the hyperplastic form, a round cell infiltration leads to the formation of tissue masses, the tuberculome. In the other, the ulcerative form, the destruction of tissue is conspicuous. This varies from a superficial erosion to the formation of deep seated, excavated ulcers, which may invade and destroy the underlying bone. The two forms are often combined, the formation of the tuberculome preceding the development of ulceration. The case I am here reporting is one of miliary tubercular nodules involving the nasal mucous membrane, not associated with general miliary tuberculosis. As far as I am aware, no similar case has been reported in the literature.

The patient is a man 43 years old, who consulted me first 16 years ago, complaining at that time of nose and throat symptoms which were associated with marked enlargement of the cervical lymphatics, chiefly on the left side. He was a man of strong, robust build. The nasal symptoms had been annoying him for about two years. These were characterized by sensations of soreness and most annoying burning and dryness of the nose. A similar annoyance was experienced in the pharynx, especially in the epipharynx. The nasal symptoms were especially marked on the left side of the nose. The patient also suffered from a great deal of left sided frontal headache. The attacks of headache were quite severe and usually lasted two or three days. For a year before consulting me the patient had discovered that he was having an elevation of temperature varying, as a rule, from 99 to 101 degrees F. On one occasion, while under my observation, this temperature was as high as 104°, but in a few days subsided to the usual 101°. The enlargement of the cervical lymphatics had begun to appear on the left side about one year before I saw him, and for six months these glands had been quite sensitive and painful.

An examination disclosed an enlargement of the cervical lymphatics beneath the angle of the jaw, on the left side, fully the size of a turkey egg. The posterior group of lymphatics on this side were also involved. On the right side the posterior chain of cervical lymphatics were enlarged to the size of a large pea. There was one isolated gland in the clavicular region about the size of a small hazelnut. The lymphatics in both axillæ and the groins were palpable but not sensitive.

A general examination was made by Dr. J. B. Herrick, professor of medicine in Rush Medical College, who found no other lesion except a nodule the size of a hickory nut in the epididymus, on the left side. This nodule the patient had been aware of for many years. There was no history of any venereal disease, and Dr. Herrick's opinion was that the nodule in the testicle might be of tubercular origin.

On examining the nose the following conditions were found: the nasal passages, especially on the left side, were quite roomy, presenting an appearance of moderate atrophy of both the middle and inferior turbinate bodies. The mucous membrane was distinctly congested and presented a dry, glazed appearance, but with no crusting or accumulation of secretion. On the septum the mucous membrane on the left side presented an unusual appearance. It was deeply congested and scattered over the surface were a number of discrete pinhead nodules. These were distributed widely over the septum. There were eight or ten of these nodules that could be seen by anterior rhinoscopy, and it seemed quite probable that there were still others located beyond the field of vision. The nodules presented a slightly grayish color, which made them stand out quite distinctly from the surrounding congested membrane.

The mucous membrane of the pharynx presented the typical pharyngitis sicca, but with no accumulation of secretions. The lateral bands were moderately swollen. The tonsils showed no evidences of chronic infection, nor was there a history of attacks of acute tonsillitis.

One of the nodules on the septum was located on the crest of a small septal spur, located near the floor of the nose, close to the entrance. This nodule was shaved off with a sharp scalpel and a piece a couple of millimeters in diameter was mounted in paraffin and sectioned. The specimen showed no break in the surface epithelium. Beneath the surface layer was the round cell infiltration typical of a tubercular process, in which here and there a giant cell was discovered. Efforts to find tubercle bacilli were not successful.

The clavicular gland on the right side was removed and turned over to Dr. Le Count, professor of pathology in Rush Medical College, for examination. His report was that the gland was the seat of a chronic tubercular process, in which he was able to discover a few scattered tubercle bacilli.

Under the direction of Dr. Herrick, the patient was placed on a regime best suited to combat tubercular disease.

The patient did not reside in Chicago but returned from time to time for observation. After several months he moved to Colorado, where he remained the greater part of two years, living in a tent. At the end of that time the enlargement of the cervical glands had practically disappeared. The annoying nasal symptoms had also disappeared. The only local treatment carried out during this time was regular cleansing of the nasal passages by means of a simple alkalin nasal wash and the application of albolin by means of an atomizer.

I have seen the patient occasionally up to the present time and he has continued to remain in robust health; no return of the nasal symptoms, the headache, nor glandular enlargement. The last examination was made March 13, 1920. At that time the nasal chambers appeared quite normal, and there was no distinct evidence of an atrophic process, which was present when he was first examined. The mucous membrane of the pharynx was also quite normal, with no evidences of dryness and no thickening of the lateral bands. The cervical glands were not palpable.

The question arises whether this was not a case of primary nasal tuberculosis, with secondary involvement of the lymphatics. One fact seems clear, namely, that the nasal involvement was not secondary to any pulmonary tuberculosis. The fact, too, that the evidences of tubercular trouble seemed limited to but one side of the nose suggests that the nasal membrane may have been the portal of entrance. It seems quite clear that the cervical adenitis was secondary to the nasal infection: first, because the nasal symptoms had been present for some time before the enlargement of the cervical lymphatics became apparent, and second, because the chief glandular trouble was on the same side as was the nasal disease. On the other hand, the presence of a number of tubercular nodules scattered widely over the nasal septum speaks rather against the origin of the trouble being in the nose, where we would expect only a single focus in case the nasal disease was the portal of infection. In view of the fact that the patient had a nodule, probably tubercular, in the epididymus, which was present for some time before his other symptoms appeared, it seems probable that this may have acted as the primary focus for dessimation of the infection, and that the miliary tubercles seen in the nose were secondary to this focus.

LVIII.

OBSERVATIONS OF THE HEALING PROCESSES FOLLOWING MASTOID OPERATIONS.*

By Philip Hammond, M. D.,

Boston.

It is still common practice to treat the operated mastoid wound by continuous packing. The old surgical adage of "allowing the wound to heal from the bottom" was dinned at us by our predecessors until we came to believe that it was gospel. No one needs to be told of the weeks, and occasionally months, required to heal a wound in this manner or of the resultant deformity from scar tissue.

Dr. Nichols has just shown us in an admirable manner what takes place in bone following operation or injury. It would appear that the repair processes are identical, whether the bone under consideration be the temporal or a long bone. It should be noted, however, that there is a departure from the common ground in the case of the mastoid, for we have in addition to our osteomyelitis accessory cavities through which the infection came. In most cases these cavities (the middle ear and antrum) are still actively involved, and one who attempts to deal with the mastoid surgically must consider their thorough and safe drainage.

Within recent years many mastoid cases, from one cause or another, have healed in an astonishingly short time. The writer knows of authentic cases of recovery in nine days; and perfect healing, or apparent healing, not infrequently occurs during the first two weeks following operation.

One of the earliest of the quick healing mastoids was observed by our late colleague, Dr. Clarence J. Blake, and it was this incident as much as any other that induced him to accept the theory of the "blood clot method" of operating. An operated case at the Eye and Ear Infirmary was so unfortunate as to develop erysipelas practically coincident with the operation, and the mastoid wound remained unpacked and with dressings unchanged for some days. To the astonishment of all, when the wound was finally exposed, it had apparently healed by primary union. Independent research carried on by Sprague, Reik and others, established the fact that in certain cases, at least, early healing without packing was practicable. There was no denying the fact, however, that many mastoids so treated broke down, with resultant purulent discharge from the middle ear as well as from the mastoid. There also seemed no doubt that many of our worst secondary complications appeared in cases where the mastoid was prematurely closed, or partially closed, leaving unorganized blood clot or loose granulation tissue. Then, too, there was no provision for furthering the discharge from the middle ear by way of the antrum and mastoid; and there are anatomic reasons why it is impossible to render the middle ear aseptic. So, while we know that the vaunted granulating from the bottom is unnecessary, and that if the mastoid cavity were a simple opening into bone, easily sterilized, it might be closed over, allowing nature to finish the cure, we face an entirely different proposition. First and foremost, we must see to it that the discharge from the middle ear stops as quickly as possible, in order to conserve the hearing as well as to prevent reinfection of the mastoid. This duty should stand out preeminent above any theory or method that aims at the rapid healing of the mastoid.

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*Read in conjunction with a paper by Dr. E. H. Nichols on "Bone Repair After Injuries and Experimental Operations."

It would appear, then, that this is the first thing we must accomplish in order to approximate the ideals which Dr. Nichols has just shown us. Of course, once we have overcome the infection, once the ear becomes dry, we are ready to start even with him, as if we were dealing with the long bones.

The writer believes that a gauze packing in the mastoid facilitates the escape of much fluid which otherwise must come through the auditory canal, prolonging the discharge. A wick should also be used in the canal. Occasionally, the ear will be dry inside the first twenty-four hours. Sometimes a bit of moisture will be apparent at the inner end of the canal for days. In any event, the gauze wick which has been inserted into the canal as far as the drum should be changed daily.

At each dressing the canal should be mopped dry and a fresh wick inserted. If the mastoid packing appears quite dry it is allowed to remain for five or six days, occasionally clipping a bit from the outer end if it has become dry and hard. Should the mastoid packing become very moist, even from serum, it would be better to remove it immediately and substitute a fresh packing. All packing should completely fill the space under treatment. In average cases the discharge from the middle ear ceases in from one or two days to a week. At about the end of the first week healthy fine granulations will begin to appear in the mastoid, the whole inner surface of which is visible at each dressing. Following the removal of the first mastoid packing, which is commonly of iodoform tape, plain gauze wicks are employed, taking the precaution, as above mentioned, to completely fill the cavity. This does not mean packing under pressure, however. This plain gauze is changed daily, and one can note the rapid drying of secretions from day to day. When at last the wicks are quite dry, about the tenth day, we are ready for our departure from the routine packing.

The writer would emphasize the importance of rigidly adhering to the details as outlined above, particularly as to the completeness of the packing. Time and again, following the insertion of a loose pack or wick, the mastoid becomes filled with purulent discharge, and frequently this condition can be cleared up by proper packing. If for any reason packings must be employed for so long a period that large granulations form in the cavity, the case will not be a favorable one for the next step.

Here we fall into line with the observations that have been pointed out by Dr. Nichols. We now have a middle ear which is no longer suppurative, and a mastoid cavity lined with smooth healthy granulations, practically devoid of discharge. Now if bone repair takes place along the periosteum and the endosteum, why not let these structures alone and allow nature free hand? This is practically what we do. The mastoid wound is completely filled with boric acid, a pad of gauze laid over the wound and the auricle gently but firmly held back against this pad by applying more gauze and a bandage. The next day the dressing is changed. No longer is a cavity visible in the mastoid. The cut edges have fallen close together;

there is a stain on the gauze pad, due to the liquefying of the boric acid, but no pus. Each day the gauze pad is changed, and in from five days to a week there will be a dry crust over what amounts to a linear scar, and the patient is well.

What has happened? No one for a moment believes that the mastoid is completely healed in such an incredibly short time. Neither is it healed after weeks of packing, if we may believe the results of Dr. Nichols' researches. Then we must fall back upon the belief that changes go on inside the mastoid for many months after the patient has been discharged as cured by the surgeon. What are these changes?

Long before the writer knew of the results obtained by laboratory experimentation on bones he had observed that patients who had been unfortunate enough to have the mastoid opened more than once, after an interval of months or years, frequently had such a firm thick cortex as to give rise to the suspicion that the former operation could not have been complete. On opening this dense bone, one uncovered a space in the mastoid, devoid of cells, filled with pus and granulations. Further observation showed that this was quite common, even where the wounds in the first instance had been packed until they "healed from the bottom." This began to look as if something were amiss in our theories regarding the healing of bone. If, despite persistent packing and firm granulations throughout the mastoid, ultimate healing leaves a solid cortex with an empty space under it, why pack? What becomes of the erstwhile solid granulations under the cortex? Here the laboratory man comes to our relief and tells us that they have changed to connective tissue, contracted, and so left the cavity. This would seem also to dispose of the question invariably asked when one for the first time sees a mastoid cavity filled with powder and allowed to heal over the surface. "What became of the cavity?" Nature would appear to have its own way regarding the healing of bone, and whether we will it or not, the cavity is bound to form and to persist. In the light of what we have seen shown as to what occurs in the long bones following operation, it would appear to be a logical conclusion that if we can deal with a fairly clean wound, the less we interfere the better. One of the things the attending surgeon must refrain from doing is to probe into the wound or to insert a gauze wick to care for drainage. There will be practically no drainage if the above conditions have been fully met, and to tear through the newly forming cells beneath the skin is to do violence to a step in healing already well started.

Naturally there will be some cases that do not heal as they should. We still have to deal with infections of varying degrees of severity, and with patients who do not have the best of resisting qualities. If purulent discharge persists in such cases, it would be folly to attempt closing the wound.

A word as to the apposition of the edges of the mastoid wound. One expects more or less difficulty in keeping the edges well together, and frequently attempts to overcome this by secondary suturing of the wound. After prolonged experience with both methods the writer finds that, by attention to the suturing of the soft tissues at the original operation, the periosteum comes sufficiently well together so that there is a minimum of tendency to gape when the packing is left out.

These few observations are recorded here, not with the thought that anything new or startling has been developed, but that we may analyze our postoperative care of the mastoid in detail, and that we may so shape our treatment as to put as few stumbling blocks in the way of nature's cure as are consistent with the safety of the patient. For the axiom is as true today as it was in the time of Esculapius, "We dress wounds —God heals them."

483 Beacon St.

LIX.

CASE REPORTS.

1.—A CASE OF MULTIPLE STRICTURES OF THE ESOPHAGUS, APPARENTLY CURED BY REPEATED DILATATION WITH GRADUATED BOUGIES.

2.—REPORT OF A CASE OF SYPHILIS, VINCENT'S ANGINA AND SARCOMA OF THE PHARYNX, FOLLOWING EACH OTHER IN THE ORDER NAMED.

By Clement F. Theisen, M. D.,

Albany.

The first case I wish to report, one of multiple strictures of the esophagus, in a woman 51 years old, presented in some respects more difficulties in the way of treatment than any esophageal case I have ever had.

The patient was referred to me eight months ago, with a history of the inability to swallow anything but liquids, for the past year. The patient is a woman of average height, and before her esophageal trouble weighed 132 pounds. When she came to consult the writer she was reduced to 104 pounds and had a markedly cachetic appearance, so the possibility of malignancy at once suggested itself. The only thing she could think of that could have a possible bearing in causing the strictures was the accidental swallowing of a little of the fluid in a bottle of smelling salts, which contains considerable ammonia. About two years ago, she stated that she was using a bottle of smelling salts, while lying in bed, and got a little of the liquid in her mouth when she tipped the bottle too much. She did not think that she swallowed more than a teaspoonful. After drinking a good deal of water, the burning sensation and irritation gradually subsided.

The difficulty in swallowing came on very slowly, gradually becoming worse, until for the past year nothing but liquid foods, and often with difficulty, could be swallowed. She was first given a barium bolus, the passage down the esophagus being watched with a fluoroscope. The bolus was arrested at the first stricture, apparently a fairly tight one. X-ray plates were then taken and briefly showed the following conditions: The X-ray plates showed five distinct strictures, the first about at the cricoid, where there is always some natural constriction, and the other four almost equal distances apart, the lowest being about 2½ inches above the stomach. The question of malignancy was probably settled by the X-ray plates, as no evidence of a growth could be seen. In order to positively confirm the diagnosis, a Jackson esophagoscope was passed, and the presence of the upper stricture confirmed.

As the patient was in such poor condition, no attempt was made the first time to get through the stricture. She was allowed to rest for several days, and then afer a good deal of difficuly a small, very flexible metal bougie was passed through the first stricture. This was done several times, before any attempt was made to get through the others. She was able to take a little more liquid nourishment, after the first few weeks and gained slightly in weight. During the next six weeks we succeeded in getting through the other strictures, the lowest one causing the greatest difficulties. Graduated metal bougies were used, beginning with small ones, and by the end of February, this year, we were able to pass a 13 mm. bougie, which is almost the size that should go through the normal adult esophagus. From this on the patient started to gain rapidly, and for the past three months she has gained nearly a pound a week. The last time I saw her, the middle of May, 1920, she weighed 129 pounds, almost her normal weight. She is now able to eat anything she wishes to, and takes three full meals a day without difficulty. The cachetic appearance has disappeared, and she says she feels perfectly well.

At the present time I pass an esophageal bougie, about every two weeks, and for the past two months have been able to use fairly soft flexible fiber bougies. The largest size passes to the stomach without any difficulty. During the first few months, when the metal bougies were used, there was occasionally very slight bleeding after the bougies were passed.

This happened only three or four times. After the first time a little olive oil was swallowed before and after the bougies were passed, and she has right along, for the last few months, taken a little of the oil before each meal.

The writer has had two other cases of esophageal strictures, both in adults, in the last few months. In both cases there was a history of the accidental swallowing of washing fluid, which contains a good deal of caustic potash.

Both these cases are doing well under the same plan of treatment used in the case reported today.

The statement was made in the title of this paper that the patient is apparently cured, and she certainly seems to be. We all, however, realize the difficulties of keeping the strictures dilated in cases of this kind, and a case cannot be called definitely cured until it has been kept under observation for a long time.

The second case is reported, not because of the rarity of any one of the three diseases, because all of them unfortunately occur frequently enough, but on account of the unusual combination of syphilis, Vincent's angina and sarcoma. It is the first time that the writer has observed these three conditions in the pharynx of the same patient. As stated in the title of the paper, they followed each other in the order named. It is possible that the syphilitic lesion and Vincent's angina were present at the same time, although Vincent's angina was not diagnosed for quite a while after a positive diagnosis of syphilis was made. The sarcoma developed after the Vincent's, and the progress of the disease could be carefully watched, as the patient was under the writer's observation continuously until he died.

This patient, a man, aged 38 years, was referred to me for an ulceration of both tonsils, that had existed for some time. On examination, we found a rather deep ulceration, almost covering the surface of both tonsils, which were large. The condition looked very much like a syphilitic lesion. No syphilitic history could be obtained, but the diagnosis of syphilis was proved by a Wassermann, which was positive. He had at this time only slight pain in swallowing. He was given a saturated solution of iodid of potash, and referred back to his physician, in his own town, for further observation. He wrote me, after several weeks, that the ulcerative process was extending rapidly, in spite of vigorous antisyphilitic treatment. I then saw him again and found that the ulceration had extended to the mucous surfaces of the cheeks and gums, around the last molars, on both sides. The typical odor of Vincent's angina was now quite apparent, and the diagnosis of Vincent's angina was confirmed by the microscopic examination of smears from throat swabs. The patient was then given by his own physician five injections of salvarsan without the slightest result. During this time I saw him every week, and in spite of the salvarsan injections, and rapidly increasing doses of potassium iodid, the ulcerative process extended steadily. He was also given the local treatment, which is usually effective in cases of Vincent's angina, continuously.

Early in January of this year the edges of the extensive ulceration, which had now practically destroyed both tonsils, uvula and part of the soft palate, became very nodular and indurated, with a rapid extension of both the ulcerative and nodular process At this time he also developed a large, very hard mass, in the left side of the neck. Clinically the throat picture was fairly typical of an ulcerative carcinoma. A piece of the very firm nodular mass from the edges of the tonsillar ulceration was removed and sent to the laboratory for examination and was found to be a round celled sarcoma. He had from time to time rather serious hemorrhages from the erosion of blood vessels by the constantly increasing ulceration. The nodular mass, which broke down rapidly, extended to the base of the tongue, and finally into the larynx, and the patient died about the middle of April. I had not seen him for several weeks before his death.

This case is reported simply because of the unusual combination of diseases. The writer has seen the combination of syphilis and Vincent's angina a number of times, and it is of course well known that syphilitic ulcers make a very favorable soil for the development of Vincent's angina. This combination, in the writer's opinion, occurs much more frequently than is generally thought.

LX.

LARYNGOFISSURE FOR CARCINOMA, WITH DEMONSTRATION OF SPECIMEN.*

By Norval H. Pierce, M. D.,

Chicago.

Laryngofissure† should occupy a more prominent position among laryngologists in the surgery of the larynx than it does. The assumption of its proper position has been delayed by the advent of direct laryngoscopy.

Diagnosis.—Except in a very few exceptional cases specimens for microscopic examination of suspected cases of carcinoma of the larynx should not be obtained by indirect laryngoscopy. The soundness of this proposition is proven by a great many illustrations in literature, a notable one being that of the Crown Prince Frederick of Germany, where a piece was taken from a portion of the larynx, undoubtedly adjoining the carcinomatous growth, which proved to be a pachydermia laryngis. Even in the very best operative hands there is a certain inexactness in indirect laryngeal operating. This may be due to the operator or to the patient himself. The laryngeal mirror does not provide sufficient visual acuity for us to always distinguish the best place from which to excise our specimen for microscopic examination, and this might lead to the removal of a part that is not carcinomatous; we know that other conditions may coincidentally exist in the larynx with carcinoma. Then, too, it is impossible to get a large piece from the depth of the growth by indirect laryngoscopy, and this is a sine qua non for reliable microscopic diagnosis in cancer. The only method that competes with laryngofissure for securing diagnostic specimens is direct or suspension laryngoscopy. But suspension or direct laryngoscopy should be employed only to make a diagnosis of the suspected tumor or to confirm a diagnosis by microscopic examination, that is all. It should not be employed for removal of the mass except in the rarest cases, where the growth is very small and superficial. In the large majority of cases that have undergone antisyphilitic treatment we can make a correct diagnosis by the laryngoscope, without microscopic examination. Suspension laryngoscopy for the purpose of confirming the mirror diagnosis of a malignant tumor is often an unnecessary ordeal. It is preferable to proceed at once, in many cases, with the laryngofissure and, if necessary at the time of operation, have the diagnosis confirmed by the freezing microtome. Otherwise, we are apt to temporize and waste time. The main considerations in treatment of suspected carcinoma of the larynx are early diagnosis and removal, and I believe that a laryngofissure provides the best means of doing this in selected cases. That means carcinomas that are small, intrinsic and limited to one side of the larynx. In 1,021 operations reported for the removal of carcinoma of the larynx by indirect and direct laryngoscopy, laryngofissure, and partial and complete resection of the larynx, in recent years, laryngofissure gives by far the greatest number of recoveries which have remained cured for a year or more. My own statistics, while embracing a small series, give a little over 50 per cent of recoveries living and without recurrence for over a year, in all cases of laryngeal carcinoma removed by laryngofissure. There can be no doubt that the condition of the patient after recovery from laryngofissure is infinitely better than that of the patient after total extirpation. The total extirpation patient is in a most pitiful plight for the rest of his life, depending upon a tube for air, and as a rule is despondent, whereas the patient with laryngofissure enjoys breathing through the natural channels, has a very good voice and is little incapacitated in any way. Laryngectomy should be reserved for large, obstructing, intrinsic laryngeal carcinomas.

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*Read before the Chicago Laryngological and Otological Society.

†Note.—These remarks relate to laryngofissure in connection with carcinoma only.

Therefore, I make a plea for laryngofissure as the procedure of preference in the surgical treatment of circumscribed, early cases of carcinoma of the lateral walls of the larynx. It is preferable to direct or suspension methods, in my opinion, because, as I have already said in a paper read before the American Laryngological Association, laryngofissure gives us greater liberty of movement, better visibility, is as rapid, quite as safe.

There are several matters in the technic which might prove a subject for a fruitful discussion among men who have had experience. To perform the operation itself requires no special preparation. It is an easy operation. There are no blood vessels that will give us great hemorrhage. The parts are very superficial, and the points we may discuss are, first, tamponing the larynx; second, the use of the tracheal tube, whether it should be used or not; third, the use of the actual cautery, radium or X-ray, subsequent to operation, and the closure of the laryngeal wound immediately after operation. These are very practical questions.

I have had unfortunate experiences in cases where the tracheotomy has been done at the time of operation. Practically all my deaths have occurred in patients who have had a tracheotomy performed at the time of operation. The reason for employment of the tracheal tube dates back to the days when the operation was performed under general anesthesia. Now, the whole procedure is performed under local anesthesia. That gives an enormous advantage over the old days when I had the honor of assisting Christian Fenger. The whole aspect of the operation has changed since then. There is no longer danger of blood getting down into the trachea or bronchi during the operation. The patient's tracheal reflexes enable him to expel anything that goes down. In cases where the tumor is small a preliminary tracheotomy should not be performed. All the cases I have operated on without a tube, where the larynx has been closed immediately, have recovered partly because they were small epitheliomas. The hemorrhage from these operations is insignificant; the swelling is very slight. Here is another matter: In none of these cases which recovered did I use the cautery nor did I use radium. We should use a tracheotomy tube, only in cases where the denuded area is going to be large, in the cases where we are going to remove part of the interarytenoid region, and in cases where we use radium or X-ray. Recently I have been using the actual cautery in these cases.

Should the tracheotomy tube be placed in the trachea at the time of operation? I should say no. The tracheotomy tube should be introduced at least eight days before the larynx is opened, and it is a question whether we should use in all cases of tracheotomy local anesthesia or gas. In one of the cases it was remarkable how the infiltration anesthesia blurred the anatomic landmark. It is easier to do a tracheotomy with gas, so far as the operator is concerned, than with local anesthesia, especially where we have a short neck to deal with, the median lobe of the thyroid projecting well up, where we have to divide it, or dissect the middle lobe and retract it downward, because of the edema produced by the infiltration anesthesia. I believe the best way to proceed in these cases is to first perform the tracheotomy, making the incision from the hyoid to the jugulum, inserting the tube, stitching the upper and lower portions of the wound, and then, say about eight days afterward, when you wish to go into the larynx, the wound can be very easily ripped open over the larynx under infiltration anesthesia and the rest of the operation performed. The patient is then accustomed to the tube and to the new mode of respiration. I believe this is a better procedure than to introduce the tube at the operation on the larynx.

In opening the thyroid cartilage there is very little to be said. We may use an ordinary pair of heavy scissors, a curved bistoury, or, if partially or completely ossified, a pair of bone forceps or a chain saw. I do not believe that it is always necessary to divide laterally the thyrohyoid membrane. Undoubtedly it gives quite a little more access to the interior of the larynx to do this, but there is a danger of injuring the laryngeal nerve if we cut too far laterally, and this should be avoided. Once we are in the larynx and the growth is on the cord, we should begin by immediately dissecting up the perichondrium from the interior of the larynx beneath the growth, and after this has been elevated just as we do in a septum operation, then the growth should be excised, after which the cautery is used, not on the surface of the thyroid cartilage—this should be avoided—but simply sealing up the cut surfaces of the soft parts. During the use of the cautery we should be careful to protect the opposite side of the larynx by means of moist gauze. The steam may burn the opposite side. We must also be careful to tell the patient to hold his breath while we are doing this, otherwise the heated steam may be inhaled and produce bronchitis. Great care should be exercised in retracting the edge of the laryngofissure. It is very easy to lacerate the edges of the mucosa of the larynx, fracture the thyroid or break off pieces on its cut edge, and this will seriously affect the postoperative course. A strip of mucosa should be allowed to remain along the cut edges of the thyroid cartilage whenever possible.

The next point is the matter of tamponing. It is unnecessary to tampon the larynx after laryngofissure for carcinoma. In cases, if I may digress a moment, of wounds of the larynx, where portions of the thyroid have become displaced, we usually have to pack in order to keep the parts in place, and because there is almost sure to be more or less suppuration, but not so in case of carcinoma. In the old days, when we used general anesthesia, the hemorrhage was very much greater and postanesthesia vomiting was to be feared, especially during the time the patient was unconscious. Now the patient is conscious; he can expel the secretion at any time and we do not need to pack for hemorrhage. On the contrary, packing is dangerous. Felix Simon reports a case, as does Schmiegelow, where the packing became displaced below the tube, causing asphyxiation. In one case, on account of the irritation produced by the packing, the patient coughed a great deal and produced a hemorrhage, which in turn induced a pneumonia. If packing is necessary, it should not be by means of a strip of gauze packed into the larynx, but by means of the Mikulicz tampon. However, in the operation under consideration packing should be avoided.

Usually we close the larynx immediately afterward. I believe we should even in cases where the actual cautery is used, because in cases I have observed, which are not enough to draw absolute conclusions from, but in the cases I have observed, the swelling, after considerable cauterization of the larynx, was insignificant. It did not produce stenosis. The case that furnished the specimen I showed here I left open.

If radium is used in these cases, then we must leave the larynx open, but I believe a certain number of fatalities will result from leaving the larynx open. My experience leads me to the conclusion that the dangers incurred in leaving the larynx open greatly overbalance the benefits derived from radium. Deglutition is very much more difficult and painful in cases where the larynx remains open. Nutrition can, therefore, be much earlier maintained in cases where the larynx is closed. It is not necessary in these cases to put stitches through the cartilage. Deep stitches through the soft parts attached through the perichondrium, and superficial stitches of silk or catgut, are sufficient and they hold very well. As a rule, the larynx closes very kindly. The best way of preventing infection is to close the larynx immediately.

Here we have points that are open for discussion, whether we should use the tracheotomy tube, whether at the time of operation or before, whether we should use a tampon, whether we should close the larynx immediately, whether we should use the cautery, and if so, whether we should close the larynx immediately, or whether we should use radium, in which event we must leave the larynx open.

REPORT OF THE PATHOLOGIST.

The specimen shown was from Dr. Pierce's last case of laryngofissure. The patient was a man in the late fifties, who in July was treated for laryngitis because of hoarseness. The diagnosis was not made; the hoarseness disappeared, but in October, 1919, it recurred without any apparent cause. At that time a diagnosis by the indirect method was easily made of carcinoma of the left vocal cord. The growth measured about one inch or less in length and about one-half inch in width, and produced a tumor that limited the motion of the cord; it was hard, immovable and surrounded by a zone of hyperemia. The man should have recovered. Laryngofissure was performed, the growth excised, the base cauterized by the actual cautery and the patient was in the usual condition of these cases for about two days, when he had a chill and died of pneumonia. The demise, he thought, could be attributed to improper after-treatment.

Postmortem revealed a completely collapsed right lung, which they had thus far been unable to account for. There was no connection between the tracheal wound and the pleural cavity. Saline solution had been injected under the mammæ, but no perforation in the chest wall could be found. Such a case was deplorable; the wound looked quite healthy. Below the tracheal opening was an area of necrosis caused by pressure of the tracheal tube.

LXI.

THE OCCASIONAL NECESSITY OF DOING RADICAL OPERATIONS ON THE PARANASAL SINUSES IN CHILDREN, WITH REPORT OF CASES.

By L. W. Dean, M. D., Iowa City, Iowa,

and

M. Armstrong, M. D., Iowa City, Iowa.

With rather considerable experience in treating paranasal sinus disease in infants and young children, we have found it only very rarely necessary to perform extensive operations upon the paranasal sinuses.

We have found that much more readily than in the adult the chronic infections of the sinuses yield to simple treatment. Approximately eighty per cent of our cases have been apparently cured by the removal of adenoids and diseased tonsils. It is noteworthy that in no instance where the hemolytic streptococcus was the bacteriologic factor, has healing resulted from this procedure.

In those cases where the removal of tonsils and adenoids has not produced a cure, rather mild treatments with or without drainage and ventilation of the sinuses, have, as a rule, produced satisfactory results.

Some six months ago, in discussing the infections of the paranasal sinuses in infants and young children, we expressed the opinion that with children we would never do an operation on the maxillary antrum through the incisor fossa. Since then we have operated upon two cases by this route. We are firmly convinced that the exigencies of the situations and the results justified the procedure.

In doing these operations and also extensive operations on the upper posterior paranasal sinuses, we have not lost sight of the deleterious influence upon the development of the bones of the face that may result from the destruction of these cells in young children. We have always held prominent the very important functions of the nose and only as a very last resort have injured structures that are essential to the performance of these functions.

We have had to deal with children with infectious arthritis involving practically every joint in the body, including the temporomandibular. This condition has progressed in spite of the removal of the tonsils and adenoids, drainage and ventilation of the paranasal sinuses and their treatment. We knew the ultimate outcome of this condition unless checked, namely, ankylosis of the joints with utter helplessness and death.

When we have had this condition to deal with and have proved conclusively that there was present in a paranasal sinus a virulent organism which when injected into an animal produced arthritis, and with prolonged treatment we have not been able to eradicate this organism from the sinus, then remembering the facts above stated, and after a most careful study of the case we have proceeded with extensive oprations. We have made every effort to preserve essential structures. In each instance the inferior turbinate has been sufficiently retained to carry out its function. It has been necessary in certain instances to sacrifice the middle turbinate. We have realized the very great need of preserving as intact as possible the inferior turbinate when the upper has been sacrificed. In this we have been very successful.

We are glad to report that where a Denker operation on the Highmorian antrum has been performed, all the teeth have remained vital.

The principal result of these operations has been the apparent healing of the sinus disease. The structures have no longer served as foci of infection. The joints have become quiescent; the pain in them has disappeared; the temperature curve has returned to normal; and, what is perhaps more important, the appearance of the patient has improved.

There is about these children, after the removal of the focus and the checking of the infection, something which is hard to describe. The listlessness which was so marked, and the expression of pain and depression disappears, and the child becomes bright and happy. The weight improves; the child enjoys play, something which he did not do before. The change is such that it justifies to us any necessary reasonable operative procedure.

Ordinarily we do not like to present case histories, as they are frequently long and tedious. We feel we can only illustrate the conditions we have had to deal with, and make plain the reasons for our doing these operations by presenting two such cases, and asking you to study them with us.

The two cases we are about to relate are two out of three cases from a very large series of arthritis cases in infants and young children, ranging from eighteen months to sixteen years of age, where we have found it necessary to do radical work on the paranasal sinuses. We have prepared two charts illustrating the temperature variations while the cases were being studied. Important bacteriologic findings are noted on the charts, as are also operative procedures.

Case 1.—R. F., referred by Dr. Steindler on January 5, 1919, for ascertaining the foci of infection. His diagnosis: Infectious arthritis.

Patient, white male, age 12 years. He is anemic looking; he is very thin; his appetite is poor; he is confined to his bed; he gives the impression of constant suffering. Almost every joint of the body is involved, including the joints of the cervical vertebræ and the temporomandibular articulation. The arthritis has been progressing for over two years. The joints are swollen, reddened and very tender. The pediatrist reports no involvement of the heart or kidneys. His daily temperature ranges from 98.8 to 100.2 degrees. He takes cold easily; he has no nasal discharge or obstruction; he has occasional attacks of sore throat; tonsils twice operated two years ago, resulting in improvement of his rheumatism.

Examination revealed a remnant of faucial tonsil on each side and a fair sized bunch of adenoid tissue in the nasopharynx. Cervical glands not palpable. There was a little mucopus in each side of the nose. The left antrum was blurred in the X-ray plate.

On January 10, 1919, the remnants of tonsils and adenoids were removed; the Highmorian antra were irrigated—the washings were reported sterile. From the tonsils a hemolytic streptococcus, a staphylococcus and the streptococcus viridans was recovered.

A rabbit injected intravenously with 1.5 cc. of a forty-four hour culture of the hemolytic streptococcus developed arthritis in each shoulder joint. From the synovial fluid in the joints a hemolytic streptococcus was cultured. No gross changes were apparent in any of the internal organs.

The patient was returned to Dr. Steindler for observation, with the request that he be returned for further examination if there seem to be a focus of infection remaining.

On June 4, Dr. Steindler returned the patient to our service. He reported that while the condition of the patient was improved, he still has acute exacerbations of his arthritis, and the daily slight rise in temperature persisted.

Examination of the nose revealed the septum deflected to the left; left antrum of Highmore contained pus so thick it could only with difficulty be aspirated; the washings from the right Highmorian sinus showed no macroscopic pus. The bacteriologic examination of the washings from the sinuses revealed a hemolytic streptococcus from the right Highmorian antrum; a hemolytic streptococcus and a staphylococcus from the left. The hemolytic streptococcus from each fermented lactose and salicin; neither fermented mannite or inulin.

A rabbit was injected intravenously with 3 cc. of a twenty-four hour culture of a hemolytic streptococcus from the left antrum. It developed arthritis in the right elbow joint; also in the left ankle joint. The paranasal sinuses of the animal were negative on culture; the lungs and pleura were normal; there was fibrinous pericarditis; there were parenchymatous changes in the liver; the spleen and kidneys were apparently normal. A hemolytic streptococcus was cultured from the elbow joint.

On May 5, the deflected septum was corrected. The nose was treated, using negative pressure and nasal irrigations of normal salt. Patient was out of doors as much as possible.

Following this operation the patient's general condition improved, but the temperature and joint condition remained as before.

On May 23, the Highmorian antra were drained through the inferior meatus. The inferior turbinates were rotated upwards, and an opening made in the antromeatal wall. The turbinates were replaced and the operation completed without sacrificing any inferior turbinate tissue. The Highmorian antra were irrigated with sterile normal salt solution followed by 1 per cent argyrol daily, and occasionally with 5 per cent silver nitrate solution.

One month later, on June 21, the patient insisted that the joints were better. His daily elevation of temperature to 100° persisted, however, and the appearance of the patient was bad. He had developed a bed sore which caused much distress. There was only a little discharge from the Highmorian antra.

At this time pus was detected coming from the region of the left sphenoid. The lingual tonsil had been frequently examined—it always appeared normal.

On June 23, 1919, the left sphenoid and left anterior and posterior ethmoids were operated. The sphenoid and ethmoids were badly diseased. The walls of the sphenoid were rough. A polyp was removed from the anterior ethmoid region. It was covered with columnar epithelium; it contained mucous glands; it was distinctly inflammatory, as shown by the large number of round cells below the basement membrane and around the blood vessels and glands; it was very edematous; the connective tissue cells have undergone mucoid degeneration. A very careful examination failed to reveal any definite evidence of involvement of the upper posterior sinuses on the right side. Consequently they were not disturbed. The nose was treated daily.

On August 23, the patient reports he is feeling fine; he can move his head better; the joints are not painful; there are no evidences of acute trouble in the joints. However, the patient looks bad; he gives the impression that he is gradually failing; daily afternoon temperature is between 100 and 100.4 degrees. The ethmoid and sphenoid regions are perfectly clean. The opening into the Highmorian antra are patent. Some mucopus is present each morning in washings from the antra. The washings still contain the hemolytic streptococcus.

On August 25, a Denker operation was performed on each Highmorian antrum.

Findings in the right antrum: Caries of the floor. Mucous membrane much hypertrophied. Three good sized polyps were removed. The polyps showed mucoid degeneration and marked purulent inflammatory changes.

The findings in the left antrum were similar to those of the right.

A hemolytic streptococcus was secured from each antrum. A rabbit inoculated with 4 cc. of culture twenty-four hours old became ill; it would not eat for two days; it gradually recovered; no arthritis was noted .

Following this operation the patient improved wonderfully. The temperature in five weeks became normal and has remained so except for the usual exacerbation present in bedridden cases in the children's ward.

His appearance has changed; he now looks well; he enjoys himself; his appetite is good.

The joints are quiescent; pressure on them does not elicit pain. Movements in the joints have increased spontaneously.

On November 26, he was transferred back to the orthopedic ward for the usual treatment for quiescent ankylosed joints. The sinuses are apparently well.

All of his teeth are vital. The only damage done to his nose is the removal of the left middle turbinate.

Case 2.—C. M., referred by Dr. Steindler on February 11, 1919, for finding the foci of infection. His diagnosis: Infectious arthritis. (See photograph.)

The trouble began during the preceding summer without apparent cause. The first thing noticed was a gradually developing of stiff knees with some tenderness. In December last, following influenza, the ankles and elbows became involved; the knees began to swell and were tender. The patient is now unable to stand on his feet because of pain in the ankles.

The patient is a white male, age thirteen years. He is confined to bed; he looks very bad, giving the impression of constant suffering. Almost every joint in the body is swollen and painful on pressure. The temporomandibular joints are involved so that the incisor teeth cannot be separated more than one-half inch. The cervical vertebræ are ankylosed, the head being fixed tilted to the left, with the chin pointing to the right. The daily range of temperature is from 98.8 to 101.2 degrees. The patient has no sore throat, hoarseness or cough. At times there is a slight cervical adenitis on the left side. No history of easily developing an acute rhinitis or of nasal obstruction. There is considerable nasal discharge.

Examination: Nose, small spur right and left. Mucopus in each side of the nose; cannot be detected as coming from any definite region.

X-ray: Shows the Highmorian antra blurred—other sinuses clear.

Washings from antra, right, discarded because of an error in technic. Left, sterile.

Throat, chronically diseased tonsils—moderate sized adenoids.

Diagnosis: Chronic tonsillitis and adenoids with sinus disease not definitely diagnosed.

It was recommended that the tonsils and adenoids be removed and the patient placed under observation.

On March 18, the tonsils and adenoids were removed. From the tonsils a hemolytic streptococcus was secured.

On April 12, the patient developed an acute exacerbation of his arthritis and a second search for foci of infection was made. The daily elevation of temperature had been constant. The lingual tonsil appeared reddened; this seemed to be just a part of the general inflammation of the throat.

The nasopharyngoscope showed the neighborhood of the ostia of the upper posterior sinuses to be edematous and reddened. No pus could be seen coming from the sphenoids or posterior ethmoids.

Washing and aspiration of Highmorian antra gave from the right a bloody fluid; from the left, mucopus. Cultures from the right antrum were sterile; from the left, a hemolytic streptococcus was secured. Two cubic centimeters of a forty-eight hour culture injected intravenously into a rabbit developed in four weeks arthritis of the ankle joints.

An opening for ventilation and drainage was made through the inferior meatus into the Highmorian antra. The after-treatment was irrigation with sterile normal salt, followed by argyrol 1 per cent; occasionally 5 per cent silver nitrate was used. Coffin's treatment was given twice daily.

Two weeks following the operation the patient was no better; his appearance was bad; the daily afternoon elevation of temperature from one to one and one-half degrees persisted.

On April 30, the upper posterior sinuses were again examined. Mucopus, very thin, was found draining from each sphenoid region, along the posterior border of the septum. About the sphenoid openings the membrane was thickened and there were numerous petechial hemorrhages. There were some flakes of pus secured from each Highmorian antrum. Cultures from each antrum and the superior meatus on each side of the nose gave a hemolytic streptococcus.

Rabbits inoculated intravenously with 3 cc. of a twenty-four hour culture of the organism from the antra produced arthritis of the knee and shoulder joints. The hemolytic streptococcus was recovered from these joints.

On May 1, the sphenoids and posterior ethmoids were drained as thoroughly as possible without removing the middle turbinates, and the openings into the antra were enlarged. There was pus in each sphenoid. The after-treatment was the same as before. The patient developed an ear infection which complicated the situation for several weeks.

The diet was carefully watched and the patient was out in the sun on all favorable days.

A purulent discharge persisted from the sphenoid and ethmoid region.

On June 18, a hemolytic streptococcus secured from the Highmorian antra produced arthritis in a rabbit.

The patient's condition was gradually improving, but the daily elevation of temperature persisted, showing that the process was not checked.

On July 21, the patient developed an acute pharyngitis. The upper posterior sinuses were discharging mucopus.

On July 23, a Sluder operation was performed on the ethmoids and sphenoids on each side of the nose. It was found necessary to sacrifice the middle turbinates. Tissue removed from the ethmoid region showed increase in cellularity; many wandering cells, lymphocytes and polynuclear cells. Most of the surface was covered with columnar epithelium; at some points stratified squamous; and in some areas the surface is denuded of epithelium and covered with pus cells.

In four weeks the upper sinuses were clean, but the antra of Highmore still contained the hemolytic streptococcus.

On August 24, the patient was much improved; afternoon rise of temperature to 100° persisted; sphenoid regions clean; some pus in each Highmorian antrum.

On August 27, a Denker operation was performed on each side and the lingual tonsil was cauterized.

Polyps and necrotic bone was found in each antrum. A rabbit injected with a hemolytic streptococcus secured from the antra of Highmore developed arthritis.

In six weeks the nose and sinuses were clean; the temperature was normal; the joints much improved. The patient has increased much in weight and says he is feeling fine. He spends much of his time playing.

From October 1 to November 28, there was no trouble in the nose or throat. The joints continued to improve.

On November 28, there was no tenderness of the joints on pressure, and the patient was returned to the orthopedic service, for the treatment of ankylosed joints.

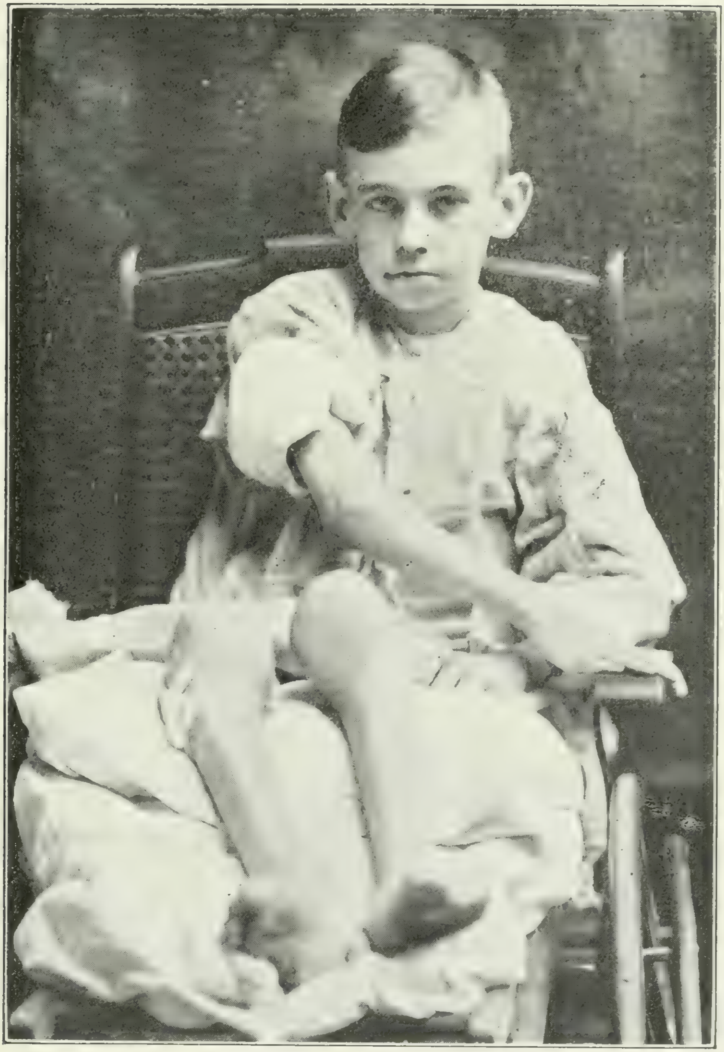
Each of these cases had a negative Von Pirquet reaction. From each, material from the sinuses was injected into guinea pigs and no tubercular lesions resulted.

CONCLUSIONS.

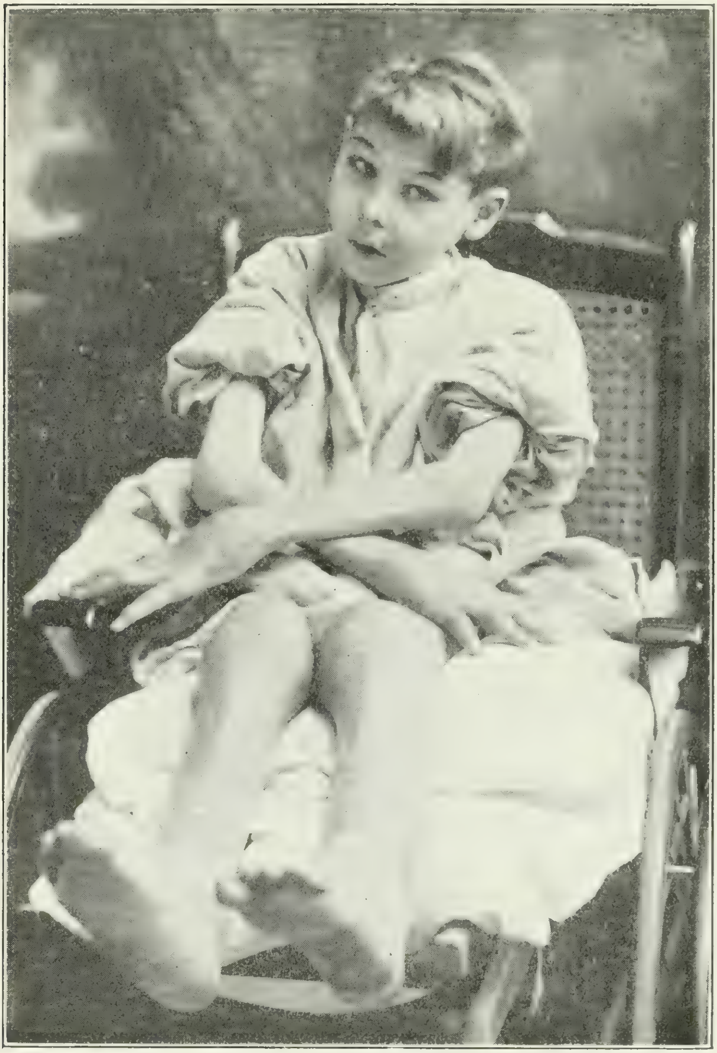
1. Every case of arthritis in children that does not do well after the tonsils and adenoids are removed should have the paranasal sinuses examined, even if a previous examination has been negative.

2. If after nonoperative or operative treatment of the paranasal sinuses a focus of infection apparently persists in the sinuses, virulent pyogenic organisms should be sought in the sinuses, and if found more drastic treatment should be instituted.

3. If after careful prolonged study it is evident that only extensive operations will remove the focus of infection, then and then only should they be performed.



Case 1.—R. F.



Case 2.—C. M.

LXII.

NERVE BLOCKING FOR LOCAL ANESTHESIA IN TONSILLECTOMY.

By John A. Thompson, M. D.

Cincinnati.

Anyone familiar with surgical work under local anesthesia knows that more complete relief from pain can be obtained by blocking the nerve than by attempting to inject its terminal filaments. The posterior and external palatine nerves, which supply feeling to the anterior surface of the tonsil, can be easily blocked at their point of emergence, immediately behind the posterior palatine foramen. This point is just internal to the third molar tooth. The glossopharyngeal nerve also sends branches to the tonsil. The relation of this nerve to the tonsil was not shown clearly enough in any book on anatomy with which we were familiar to give us a definite method of blocking it. Prof. Knower of the University of Cincinnati kindly offered his assistance in determining this relation. The mouth of the cadaver was opened and the tongue depressed until the tonsils were clearly seen. The mouth was packed to keep the parts in this position, and the body hardened. An anteroposterior section was then made at the level of the lower third of the tonsil.

This special section shows that just outside the constrictors of the pharynx is a space of loose connective tissue which is continuous from the pharyngeal wall, outward and backward, surrounding the carotid arteries, hypoglossus, superior sympathetic ganglion and plexus, vagus and glossopharyngeal nerves. In this loose areolar tissue is found a rich vascular plexus with some large veins.

We can infiltrate this connective tissue space and block the glossopharyngeal nerve by one injection made external to the anterior pillar of the fauces, at the junction of the upper and middle thirds of the tonsil. At this point there is only mucous membrane to be penetrated by the needle. A large amount of a one per cent procain solution with epinephrin added should be injected. We have used four drams of the one per cent solution for anesthesia. Ten minims is injected on each side of the palate and two drams in the connective tissue for each tonsil. Injecting here, there is no danger of thrusting the needle through a deep tonsillar crypt, carrying infection into the neck tissues with production of a cervical abscess. A guarded needle with one-half inch bare can be used. A preliminary surface application of a twenty per cent cocain solution makes the injection in the palate and pharynx painless.

It will be noticed that the vagus nerve is also in this connective tissue space. A number of experiments were performed in the laboratory of the University of Cincinnati by Dr. Tucker to learn whether or not the blocking of this nerve would have any harmful effect. Direct infiltration of the nerve with the solution produced no change in the heart rate or in respiration. The effect of electrical stimulation above and below the point of local anesthesia was the same as stimulating the cut ends of the nerves. There are some large veins in this connective tissue space. The direct injection of the solution, if a vein should be penetrated by the needle, was shown to be without danger by a series of experiments on dogs. Six decigrams of procain injected intravenously did not kill the dogs.

I have used this method in approximately two hundred tonsillectomies.

One very important point noticed is the small loss of blood. The injection of a large amount of fluid containing epinephrin into the connective tissue space stretches and contracts the vessels supplying the tonsil. The tonsil will be almost white when anesthesia is complete. When the stretched vessel is cut there is an immediate contraction and blocking of the vessel. It is not unusual to do a double tonsillectomy without loss of more than a dram of blood. Some cases bleed, but the amount of hemorrhage is not one-tenth as great as that under ether anesthesia.

The completeness of the anesthesia secured by blocking the posterior palatine nerve in the palate and the glossopharyngeal before it reaches the tonsil is hard to determine accurately because of the different mental attitudes of patients toward the operation.

One patient operated on fainted when the cocain solution was brushed over the palate before the injection was given. When she was revived the procain was injected and the tonsil removed with the Beck snare. She said the operation was painless. Many patients have made similar statements. In most cases, though, there is some pain when the snare is used as the final step in the operation. In cases where the Beck snare cannot be used the dissection is painless, but the traction on the tonsil when the snare is applied is painful. As this part of the operation takes only a half minute for each tonsil, the amount of suffering is not great and certainly less than that endured after ether anesthesia.

The anesthesia is much better than that we have obtained by injecting the tonsillar plexus. In patients where we have obtained anesthesia of the tongue, tonsillectomy is painless. Sometimes the removal of one tonsil is painless, while pain is felt in removing the other, showing that our technic is not quite perfect.

RECAPITULATION.

Both nerves supplying sensation to the tonsil region can be blocked by injection of procain solution.

Complete anesthesia is possible by this method.

The amount of blood lost is much less than with general anesthesia or where injection of the pillars is used.

The method is as free from danger as any surgical procedure can possibly be.

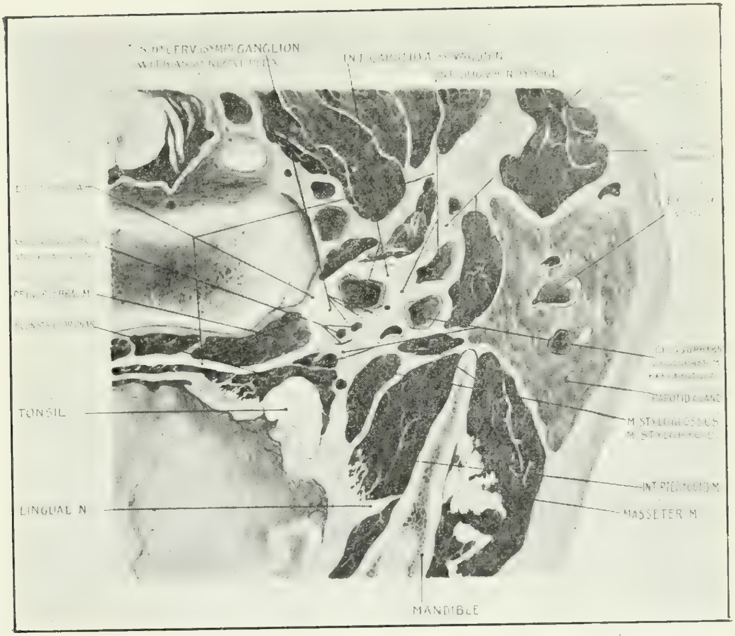


Fig. 1. Showing anatomic relations of tonsils.

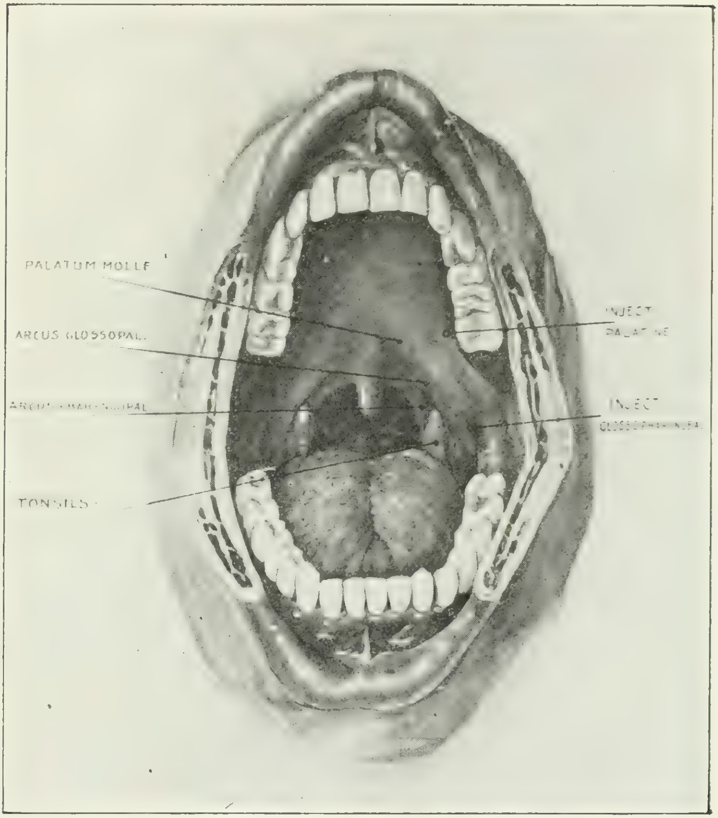


Fig. 2. Showing position of injections.

LXIII.

CASE OF UNUSUALLY LARGE FRONTAL SINUS.

By N. S. Weinberger, M. D., and Sydney Purkiss,

ROBERT PACKER HOSPITAL,

Sayre, Pa.

During the routine of hospital work we discovered an unusually large frontal sinus, or rather, sinuses. We delved into the literature on this subject, and although rather limited we gathered some very valuable and interesting material. We were especially interested in the comparative frequency of absence of one or both frontals and the average size of these sinuses in man. Many of us have undoubtedly diagnosed frontal sinusitis and even seriously considered operation and have been surprised when the skiagraph showed total absence of the sinus. We know that in a few instances serious mistakes have occurred. A. Logan Turner says: "One or both frontal sinuses may be absent. When we say the frontal sinus is absent, we mean there is no cavity extending into the vertical portion of the frontal bone. This does not, however, exclude the possibility that a small frontal air space exists between the two laminæ of the orbital plate. The frequency of this happening differs in different races." He examined 578 skulls in the anatomic museum of the University of Edinburgh. Two hundred and forty were Europeans as follows: Scottish, 124; English, 16; Irish, 20; French, 37; German, 13; Russian and Polish, 8; Swiss, 7; Greek, 6; Turkish, 3; Austrian, 2; Danish, 1; Flemish, 1; Italian, 1, and Spanish, 1. The largest pair seen in the Scotch were right 47 by 42 and left 51 x 53 mm. The smallest pair right 20 x 18 and left 16 by 13 mm. The average size of both cavities was 29.8 by 26.6 mm., the right sinus slightly larger than the left. Calculations based on examination of several hundreds of frontal sinuses represent a standard sinus as being 31.6 mm. in height by 25.8 mm. in breadth. As to presence and absence in 124 Scotch skulls: Both sinuses were present in 76.6 per cent;

both sinuses were absent in 12.1 per cent; right sinus absent in 4.8 per cent, left sinus absent in 6.4 per cent, making one or both absent in 23.2 per cent. The average size of frontal sinuses in 240 European crania was 33.5 by 28.7 mm., the largest being German. As to presence and absence in 240 Euroepan crania, one or both were absent in 17 per cent; of these, 7.5 per cent represents total absence. He finds the average depth of the frontals in 71 skulls to be 5.2 mm., the variation being from 2 to 16 mm., 16 mm. being exceptional. The sinuses were more frequently absent in female crania.

J. Parsons Schaeffer says: "The anatomy varies greatly in size, shape and type. Right and left are generally asymmetrical, and either or both may be present in duplicate or triplicate. He has seen four frontal sinuses on one side—each with an independent communication with the cavum nasi. Agenesis of the frontal sinus is most unusual in his studies. He thinks errors have been made in supposing it to be absent where there was no pneumatization of the frontal or vertical portion of the frontal bone, and that the frontal sinus in some cases never does invade the vertical portion of the frontal bone but develops wholly in the horizontal portion and is of the orbital type. In this class of sinuses any ordinary procedure to expose the frontal would ofttimes fail to reveal it. He describes a common type of duplicate frontal sinus, the simple sinus pneumatizing both the horizontal and vertical portions of the frontal bone. He thinks sometimes the sinuses remain so small as to be mistaken for agenesia and describes a dissection when the frontal sinuses were represented by two small cells well down toward the root of the nose, and their combined capacity was only 1 cc. He says the skiagram is valuable but not infallible in determining presence or absence of, and extent of the frontal sinus in the region of the forehead. When they are supernumerary, skiagraphy may be in error. Rhinoscopic examination is an invaluable supplement. One gathers from his experience that the frontal sinuses are rarely absent and that duplication and triplication are common; that if absent in the vertical position, it is usually present in the horizontal position of the frontal bone, hugging the ethmoid labyrinth and extending far into the roof of the orbit, both dorsally and laterally. He admits that the ethmoid cells may develop far into the frontal region and in many cases might be classed as frontal sinuses, and that when there are two large sinuses on the same side of the frontal region it is hard to say whether they are both frontal sinuses or extensively developed ethmoid cells.

A. W. Meyer states that he thinks the entire absence of the frontal sinuses is probably not so rare as Schaeffer implies and doubts whether their absence is as common as Boege reports. Boege published an excellent summary of the literature and found bilateral absence of the frontal sinus in 4 per cent of 203 skulls examined.

Austin reports the case of a woman, 29 years of age, who suffered with pain over and behind the left eyeball for eight years, with discharge of pus from the left nostril for two years and recent swelling of upper eyelid. Examination showed pus came from region of left infundibulum and anterior ethmoid cells. He removed part of the middle turbinate and obtained temporary relief. The week before, he had operated upon another case similar to this and found a frontal sinus full of pus, so he cut down on this also. What he took for the anterior wall of the sinus seemed rather thick, and then to his surprise dura mater came into view. He explored the bone on both sides of the first opening, with the same result. The wound closed, healing by first intention. A subsequent skiagram showed absence of the frontal sinuses and, as he himself says, "A skiagram after operation was like shutting the stable door after the horse had bolted."

Goldsmith says that the complete absence of one or both frontal sinuses and frontonasal ducts is not unusual and exhibited the sectioned skull of a Canadian Indian to strengthen his contention.

Shambaugh claims that the absence of one or both is not unusual. He has about a dozen preparations showing absence of one or both and thinks the variation is as a rule bilateral. He never saw a large frontal sinus on one side and absence on the opposite side, but occasionally finds a small frontal on one side and absence on the other side. In contrast with these he has preparations showing an unusually larger sinus and considers them of practical interest because they are especially likely to become the seat of severe infections and if operated upon externally are liable to cause a very disfiguring scar. We can at least gather from this that to operate upon the frontal sinus without a skiagram in addition to transillumination may sometimes prove a serious matter and involves a responsibility not to be lightly assumed. Even then there are times when it is very difficult to be certain about the exact conditions present. The skiagram may at times not enable us to distinguish between a large high anterior ethmoid cell and absence of the frontal sinus. It is at times well to introduce a probe and make the skiagram with the instrument in situ. Two good views should always be obtained, a posteroanterior and a lateral, and these should be at hand when the operation is being performed so that divisions and septa with blind pockets are not overlooked.

The patient whose sinuses are herewith reported came to us with oculomotor paresis, both internal and external, of the left eye, which proved to be specific. The photographs demonstrate the enormous size that the frontal sinuses at times attain. Should it be neecssary to operate upon a sinus of such size externally the patient should be previously informed of the deformity that would in all probability result. These sinuses show not only a very unusually high vertical portion but a very deep horizontal extension over the orbit, and one can easily see how severely adjacent structures might be affected in case of their infection.

Anticipating the fact that the accompanying photographs may provide material for discussion, we wish to give a brief outline of the method used in making the radiographs.

The posteroanterior view was made with the patient in the prone position face downward, nose and forehead resting on the plate, the tube being centered over the median line about one inch above the occiput at a distance of twenty-four inches, using a head clamp and compression. The lateral view was made with the patient lying on his left side, the tube being centered over the orbit at a distance of twenty-one inches, again using the head clamp and compression. In this view the upper brim of the orbits are shown to be slightly out of alignment, a fact which we surmise to be due to the shape of the head, making it difficult to get a perfect alignment under compression. Subsequent radiographs made of other cases, using the same method with regard to distance, direction and position of the patient, have failed to reveal any magnifying of the parts taken when compared with the original, therefore we have no hesitancy in saying that the following measurements are true in all detail. The vertical portion of the sinuses, as shown in the lateral view, measures 3¾ inches or approximately 95 mm. The depth over the orbit measures 2¼ inches or 57 mm. The width from the median line measures 2⅜ inches or 60 mm. on the right side and 2¼ inches or 57 mm. on the left.

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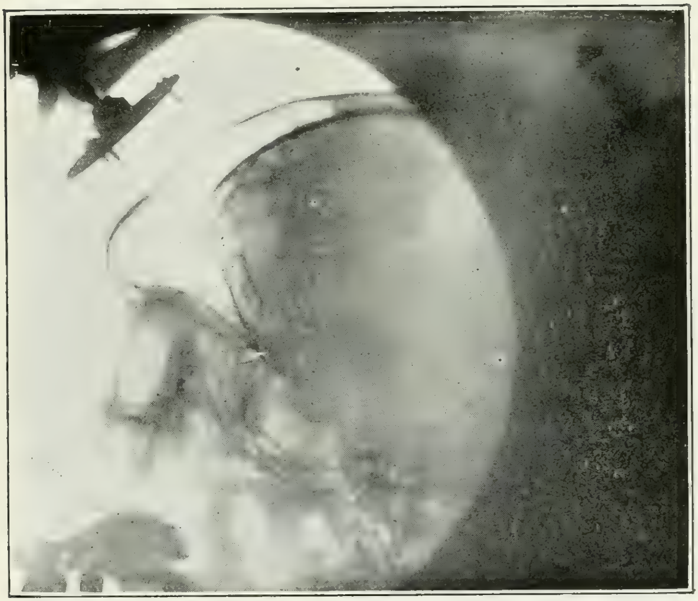

Fig. 1. Lateral view.

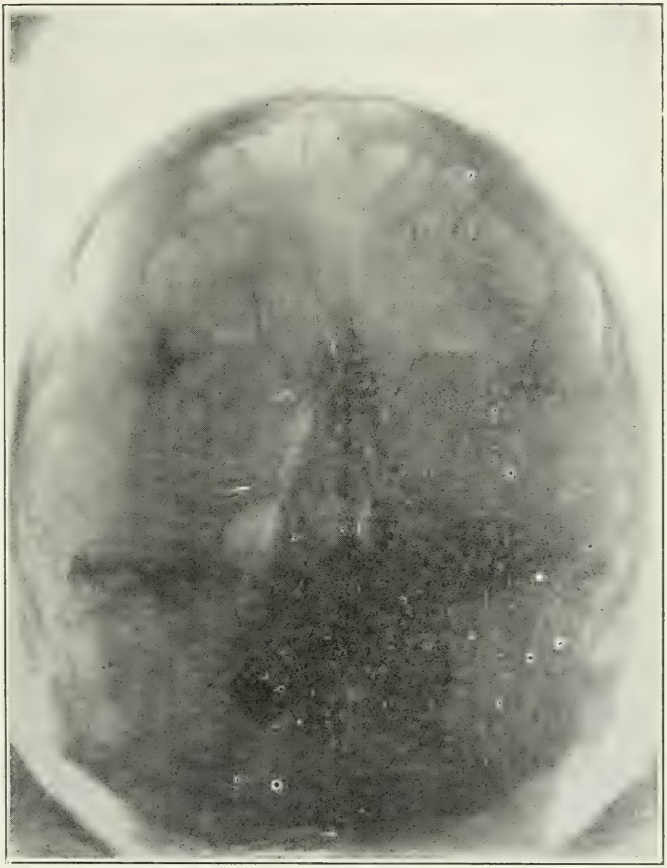

Fig. 2. Anterior view.

LXIV.

INTRANASAL DRAINAGE OF THE FRONTAL SINUS AND ANTERIOR ETHMOID CELLS.*

By Edwin McGinnis, A. B., M. D., F. A. C. S.,

Chicago.

Correct surgery should be founded on physiology and anatomy. It is on this basis that it seems to me some of the well known nasal procedures are wrong; for example, cauterization of septum or turbinates, while the submucous correction of the nasal septum is right.

Likewise, in the treatment of acute or chronic fronto-ethmoidal infections, we should consider two factors, the physiologic functions of the nose, and of the epithelial cilia of the mucous lining. Our efforts should be to aid nature in the restoration of the activity of the parts. As suggested by Smith, Wright and others, the functions of the intranasal structures are fourfold:

1. To warm the inspired air.
2. To moisten the inspired air.
3. To filter the inspired air.
4. Olfaction.

"They believe that the efficiency of each one of these processes depends to a very large extent upon the regulation of the vascular apparatus; that dilatation of the blood vessels, when it is not carried to a point of rendering the amount of air supply to the lungs inefficient, renders the air when it reaches the pharynx not only warmer and moister, and freer of dust and bacteria, but that by filling the unnecessary space in the respiratory region of the nose, it directs a more copious supply of it toward the olfactory regions."

The same authorities believe there is one point on which not enough emphasis has been laid, and that is the action of the epithelial cilia. "The cilia in the maxillary sinus remove foreign material from its interior out through its natural opening. They cite in proof the fact that if the maxillary sinus of a dog is opened on its external surface the sprinkling of a few grains of carmine powder on the mucous membrane will be followed by its prompt appearance in the nasal chamber itself waved out through the natural opening by the cilia with which the membrane is supplied."

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*Read before the Chicago Laryngological and Otological Society.

All of the sinuses, and part of the nasal mucosa are supplied by cilia. "The surface epithelium of the nasal mucosa is described by Wright and Smith as "ciliated columnar epithelium in the respiratory parts of the nose posterior to the vestibule and nonciliated above in the olfactory regions, where its various layers act as supporting cells for the cells of olfaction. This description is more accurate for children than adults. In adult life the flat celled epithelium is a common form in the respiratory tract, Oppikofer stating that in 200 cases exclusively columnar epithelium was found in less than 20 per cent over the turbinate bodies. In the majority of cases it is of the mixed type. It is idle to attempt to decide how much of this is due to the metaplasia of pathologic processes.

So in our operative work it behooves us to remove as little as possible of this necessary tissue. Many of the ideas and much of my enthusiasm for this work came through the opportunity of study with Dr. Harris P. Mosher of Boston. Long association in the practice of the late Dr. E. Fletcher Ingals of this city gave me a chance to study end results in all of the treatment and operative procedures in the nose. This study led me to the purpose of aiding nature, not handicapping her. All of the operations on the frontoethmoidal region sacrifice the middle turbinate, either in part or as a whole, except Max Halle's new operation, in which he raises a flap of mucous membrane in front of the anterior end of the middle turbinate; and Dr. Otto T. Freer's operation.

This field has been developed by the work of the late Dr. E. Fletcher Ingals, the first to develop a systematic plan of intranasal drainage. He was followed by Good, Halle, Mosher, P. Watson-Williams, Herbert Tilley, Segura, Vaccher and Sullivan, Sluder, Shambaugh and Otto T. Freer. The Lothrops of Boston have given us an internal-external operation on the frontals only. It is interesting to find how these people working in the same field have come to the same ideas. In this work I have tried to simplify the procedure of operation so that anyone with a knowledge of the anatomy can get good results. This procedure is suitable for the simple acute as for the chronic cases, even those resulting in polypoid degeneration. In fact, these latter are the cases where it is especially good. The idea of aiding nature, not handicapping her, and leaving an area better suited to the needs of the individual than it was before operation is the purpose, then, of my plan of treatment. Furthermore, I have kept in mind the anatomic relations of the parts.

According to Skillern: "The frontal sinus embryologically is merely an offshoot from the ethmoid labyrinth. In the disarticulated frontal bone, the frontal sinus appears merely as a cavity divided by a septum. The ethmoid closes in these apertures from below, thereby forming the floor of the frontal sinus. It will thus be seen that the floor of the sinus is in reality a portion of the ethmoid capsule."

Skillern further says: "The anterior wall of the frontal sinus is composed of cancellated bone tissue and varies in thickness from one-sixteenth to five-eighths of an inch. The posterior wall is thinner, rarely exceeding one-sixteenth of an inch; however, it is composed entirely of compact bone tissue, which somewhat compensates for its lack of bulk. This structure forms part of the wall of the anterior cranial fossa and is in contact with the frontal lobe of the brain. The inferior or orbital wall is the thinnest."

Defects in all these walls have been found. The interior of the sinus has partial septa, occasionally almost complete septa. It is lined with columnar ciliated epithelium. Mosher states: "The frontal ostium is located at the posterior internal angle of the frontal sinus an eighth to a quarter of an inch from the medium septum, and is the upper end of the nasofrontal duct. The remainder of the drainage space of the nasofrontal duct is in the anterior ethmoid region. It may drain into an anterior ethmoid cell, or it may end in the unciform groove, or it may end under the anterior end of the middle turbinate above and distinct from the unciform groove."

Skillern has stated the location of the lower end of the nasofrontal duct to be

1. At the superior extremity of the infundibulum.

2. Anterior and superior to the hiatus semilunaris.

3. On the roof of the middle nasal passage, at the insertion of the middle turbinate. The frontal sinus may empty into an anterior ethmoidal cell. Onodi reports the occurrence of a double nasofrontal duct."

Mosher described "the ethmoid body as outside the cribriform plate, and as rising an eighth of an inch above it. It is bounded anteriorly by the posterior and inner surface of the ascending process of the superior maxilla, and by the posterior surface of the internal angular process of the frontal bone. Posteriorly, the labyrinth is in part free in the nasal cavity and in part united to the front face of the sphenoid sinus." The orbit lies to the outside, and the inner border is the turbinal plate of the middle turbinate."

My examination of many lateral nasal walls in cut sections of heads reveals something in the accessory sinuses that was illuminating to me The middle turbinate divides the ethmoids into an anterior and a posterior group. The sphenoid, of course, by its position, is in the posterior group. The sphenoid and posterior ethmoid cells drain into the sphenoethmoid recess. This recess is large, and as far as I can see there is very little to obstruct its lumen. The openings of the posterior cells are large, with nothing to obstruct their drainage. The anterior group, on the other hand, open into a space that has changing boundaries, with the middle turbinate overhanging it. The septum in this location is subject to great variations in thickness and in irregularity. The anterior ethmoids, frontal and antrum drain into this middle meatus. The upper ethmoid cells of the bulla drain backward high up underneath the middle turbinate into a space that is very easily obstructed. The antrum and frontal exits are in the immediate vicinity, so that infection in one cell means possible infection in all cells. Anatomically it would seem impossible for one sinus to be infected without involvement of all the others. So in the treatment of one sinus we have to take into consideration all of the middle meatus group.

The ethmoid cells are divided into anterior cells which drain in front of the insertion of the middle turbinate (middle meatus) and posterior cells draining behind the middle turbinate. The opening for drainage of the frontal sinus, anterior ethmoid cells and antrum are near together and are underneath the middle turbinate. The drainage we are proposing is for the frontal to drain forward and very much higher up; to cut through any cells in front of the unciform groove, and to open the front wall of the ethmoidal bulla, giving the upper cells two openings, one natural and the other acquired; and to open the front wall of the inferior cell of the bulla which drains behind insertion of the middle turbinate. This procedure relieves the congestion, as it were, in the middle meatus. The structure of the ethmoid body admits of this procedure, as it is made up of an eggshell like bone covered by its special mucous membrane. If you cut into the walls cleanly, the remaining walls stand up, and cut edges heal over perfectly. The result from this operation is to give gravity a chance to help the other measures of drainage. With this state of affairs the antral ciliæ are not so likely to be overwhelmed or to allow that cavity to be filled with pus from the regions above.

The frontal ostium is a definite ring like structure with a hard bony outline, lined with mucous membrane, and under ordinary circumstances is sufficient for drainage of its particular sinus. The obstruction to efficient drainage comes farther down in the anterior ethmoid region. In my plan of operation, we open the way as near to the ostium as we can, but no special effort is made to break into the sinus. This leaves the normal relations of the frontal sinus intact.

OPERATION—LOCAL ANESTHESIA.

In cases where the septum is so deflected or thick as to obstruct the ethmoid region, a preliminary submucous resection of the septum aids very much in the work. I do what I call a high submucous operation, bringing the ethmoid in view on both sides. In fact, it was this operation that opened my eyes to the ease of opening the ethmoid capsule.

1. Patient sitting in chair.

2. Application of adrenalin 1-1,000 on a cotton swab to the anterior end of the middle turbinate, and as high above this as you can go with comfort to your patient, and lastly, application to the septal mucosa opposite.

3. After shrinkage is complete, one more application of adrenalin on both sides of the turbinate and to the ethmoid bulla.

4. One application of cocain 20 per cent made to the surfaces above mentioned.

5. After waiting a few minutes proceed with the operation.

6. Patient's head in extreme extension. With Grünwald's forceps, bite into the mound of an agger cell if one is present or into the front of the ethmoid labyrinth above attachment of middle turbinate, leaving attachment intact. If there is one or more agger cells, part of the inferior and superior and posterior walls is cut away, and above these some of the front wall of the nasofrontal duct.

7. Next, with the same forceps, push the free border of turbinate toward the septum and bite through the front of the lower cell of the ethmoidal bulla; then bite a channel through the front wall of the bulla, thus opening all the cells. All cutting is done in an up and down direction, parallel with the orbital and turbinal plates. Patient is awake so that any pressure on orbital plate is felt by him and avoided by you. Under operation, four of my cases complained of pain in shoulder and side of neck, due to stimulation of sphenopalatine ganglion. I next try to pass a catheter into frontal sinus, and if I am successful irrigate it gently with warm sterile boric solution. In a few instances I have not been successful after two attempts in this, but the result has been good nevertheless.

8. I usually put a long strip of rubber sponge along the floor of the operated side of the nose, the posterior end of which plugs that choana with the front end well forward into anterior naris. Any hemorrhage will be anterior and gives patient less discomfort.

9. After-treatment, very simple irrigation of nose once or twice a day and an oily spray three or four times daily, containing thymol, grain 1-3, cocain alkaloid, grs. 3, menthol,

grs. 3, olei vaseline, oz. 1. I do not irrigate the sinus after day of operation.

I will cite a few characteristic cases:

Case 1.—A. E. B., dental student, referred by Dr. Shafer. Consulted me Dec. 27, 1918, with the following history: Dec. 15th, took cold and two days later had pain between the eyes and over right eye. No discharge at first, but after a nasal treatment Dec. 20th, discharge commenced the next day. Examination: Nose, septum irregular, tubercle thick; pus discharging from underneath anterior and right middle turbinate. Left naris, normal. Shadow over right frontal by transmitted light, other sinuses normal. Dec. 27th, 2 p. m., at the Presbyterian Hospital, under local anesthesia, I did this operation on the nasofrontal duct and opened an agger nasi cell. No packing. Dec. 28th, no headache or pain. Thin watery discharge. No pus seen on examination. Dec. 30th, no headache or pain, thin watery discharge, some pus in nose. Jan. 2, 1919, no pain or tenderness over eye, no headache, some mucopus seen in right naris. Jan. 9, 1919, no pain, very little discharge. Jan. 16th, felt very well, no discharge for two days. Transillumination: both frontals light up equally well. Discharged.

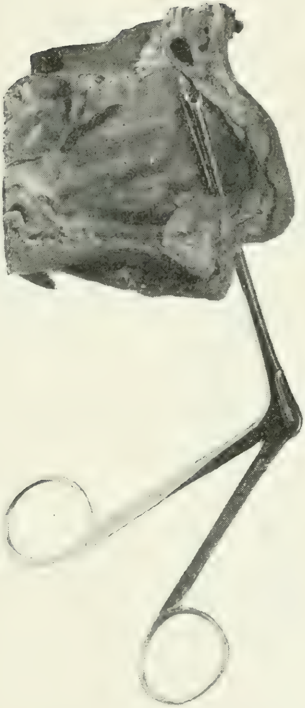
Case 2.—K., medical student. Headache and pain over left eye for two days. Shadow over left frontal by transmitted light. Other sinuses normal. Did intranasal operation. Passed eustachian catheter and sent to X-ray. Washed out frontal sinus with warm sterile boric solution. Saw him next day, headache very much less and in ten days the trouble had cleared up completely.

Case 3.—E. B., referred by Dr. Raulston; 48 years of age; agar maker; Jewish. Consulted me on August 16, 1919, complaining of headache, cough and loss of weight. Headache started four days before. He thought that it was caused by the cough. It was very severe at first, but had subsided, and he said that he felt it very slightly then. It began about ten o'clock in the morning and grew worse until he went to bed. He had had a similar attack 18 years before—had been treated at the county hospital. Sick about six weeks at that time. He had a left sided mucopurulent discharge. Examination: Leucocyte count, 21.600. Nose: Septum deflected to the left. Slight purulent discharge from underneath anterior end of left middle turbinate. Nasopharynx normal. Tonsils normal. Larynx, trachea and base of tongue normal. Marked shadow over left antrum and left frontal sinus. Other sinuses normal by transmitted light. August 18th, cocain anesthesia. Shortened left nasofrontal duct and opened up anterior ethmoid cells and irrigated left antrum. Eustachian catheter through nasofrontal duct into left frontal sinus. Patient sent to the X-ray. No packing used. August 19th, patient said headache had entirely gone. Discharged from hospital. August 27th. Examination: Nose, no discharge from either side, and patient said he felt fine.

Case 4.—W. A. W., referred by Dr. A. Purves, Des Plaines, Ill. Nose stopped up and a purulent discharge from both sides. The late Dr. W. E. Casselberry had removed part of the middle turbinate on both sides, also on several occasions had removed polypi. Examination: Nasal polypi in both sides of nose. Septum thick and deflected to the left. Sept. 2, 1919, at Presbyterian Hospital, I did a submucous resection of the septum. Removed polypi with snare. Then did this frontoethmoidal drainage. Pus flowed out of bulla when it was opened. Usual after-care. Sept. 26, 1919, nose is fine, very little discharge.

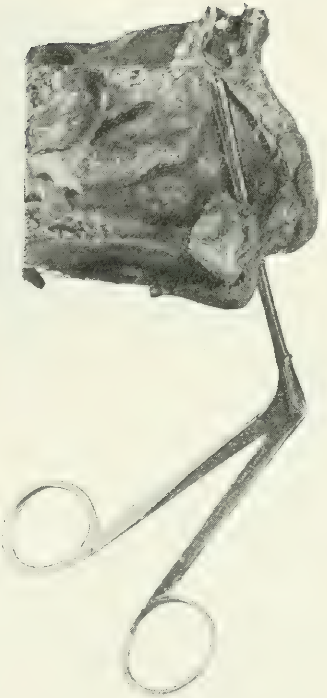
In all, I have operated about sixty cases without any untoward results, no black eyes, no edema of the eyelids, no infections of the orbit, and, with the exception of one acute case of frontoethmoid and antrum infection, very little pain after operation.

In undertaking the treatment of a patient really suffering with acute or chronic frontoethmoidal infection, we are assuming a great responsibility. It is not a question of which method is used to get drainage, but of the condition of the patient's nose as a result of the operation. The ideal, of course, is the treatment that gets the patient well in the shortest possible time with a nose that functions better than it did before the beginning of the treatment. Our aim should be to treat our patients, as well as the condition, and to give them a better nose, instead of a handicapped one, as has been the unfortunate result in some of our work in the past.



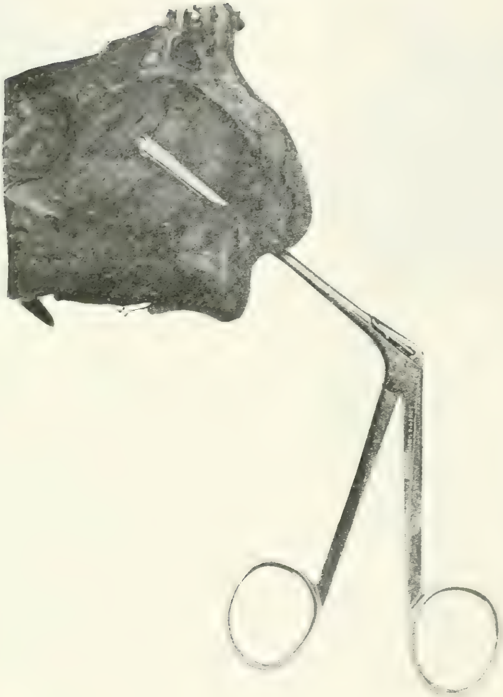
1.

Forceps entering agger cell or anterior end of ethmoid just above anterior border of middle turbinate.



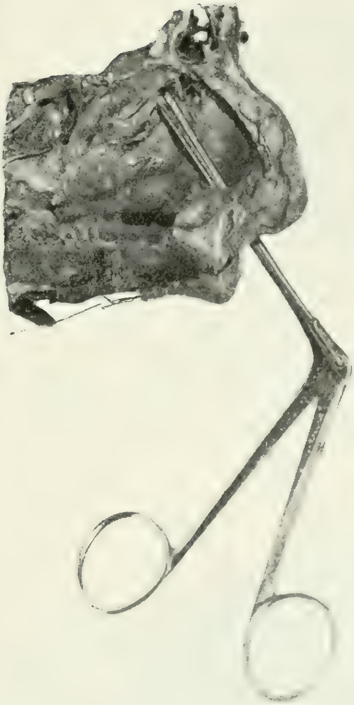
2.

Forceps biting up to the frontal ostium or into the floor of frontal sinus.



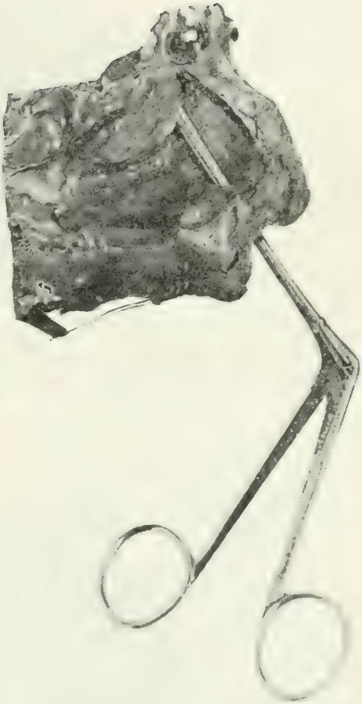
3.

Forceps entering front of lowest cell of the ethmoid bulla to bite a channel up the front wall of the bulla.



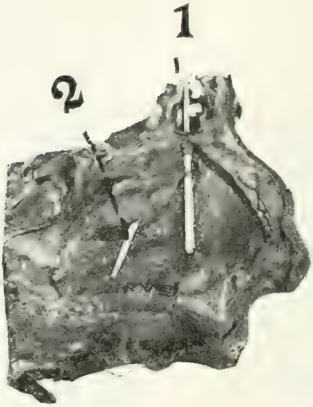
4.

Forceps progressing up front wall of bulla until it reaches frontal ostium.

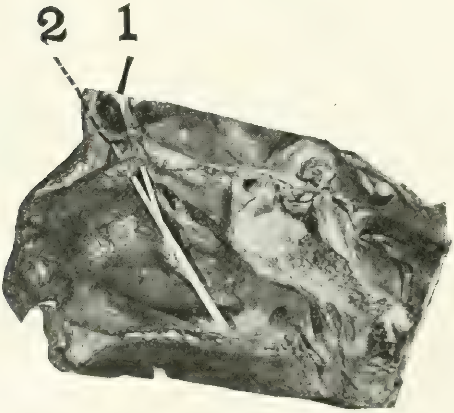


5.

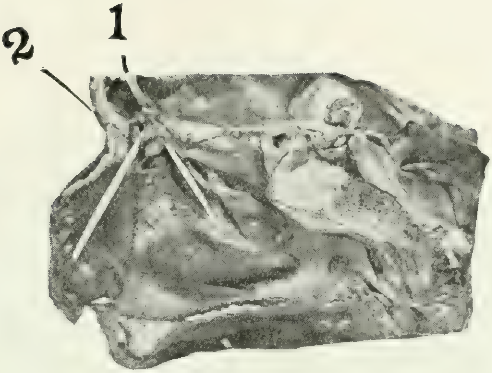
Middle turbinate in position with forceps making cut in front wall of bulla.



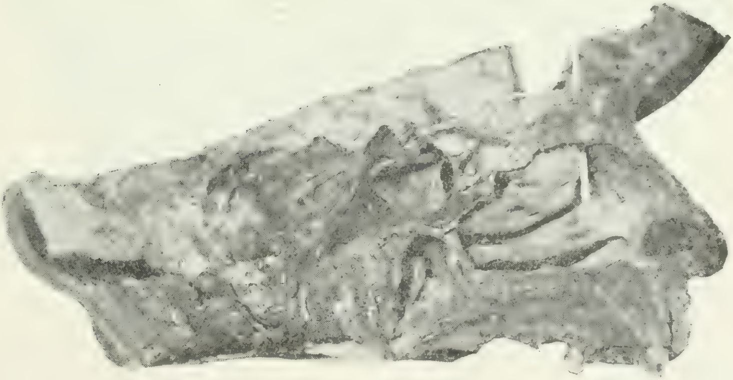
1.
1. Toothpick in new drainage way.
2. Toothpick in line of original nasofrontal duct.



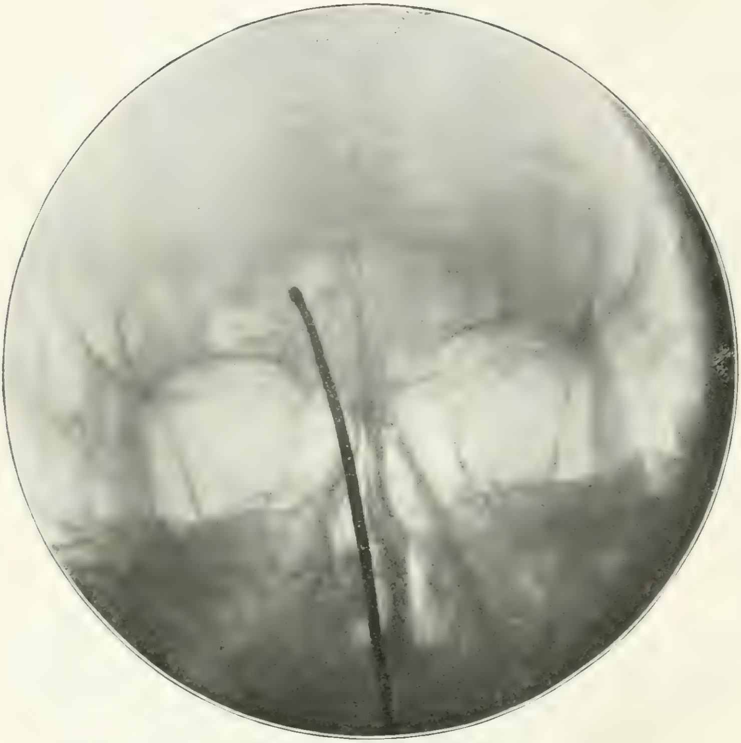
7.
1. Toothpick in nasofrontal duct.
2. Toothpick in an agger cell.



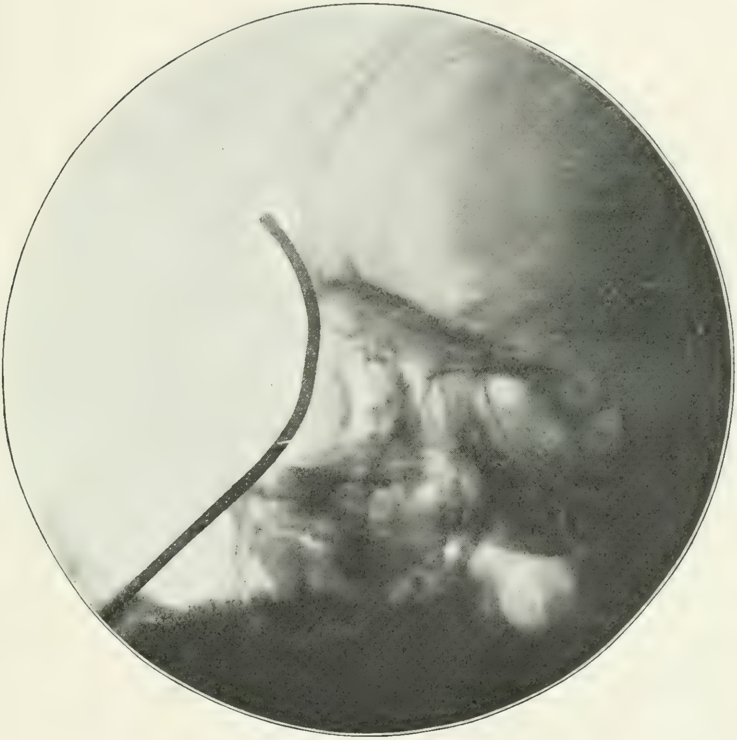
8.
1. Toothpick in nasofrontal duct.
2. Agger cell opened and toothpick into frontal ostium.



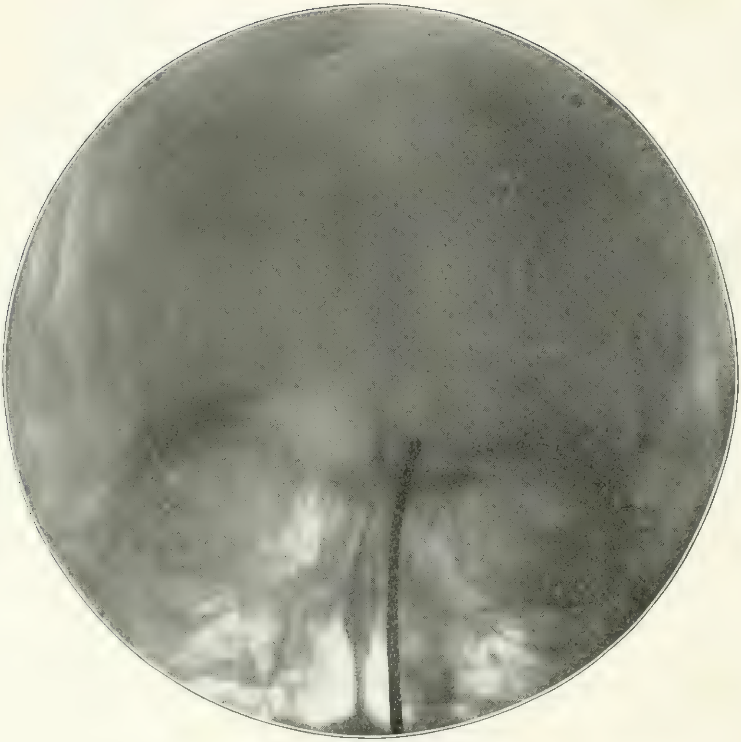
9.
Operated case—toothpick in the frontal sinus.



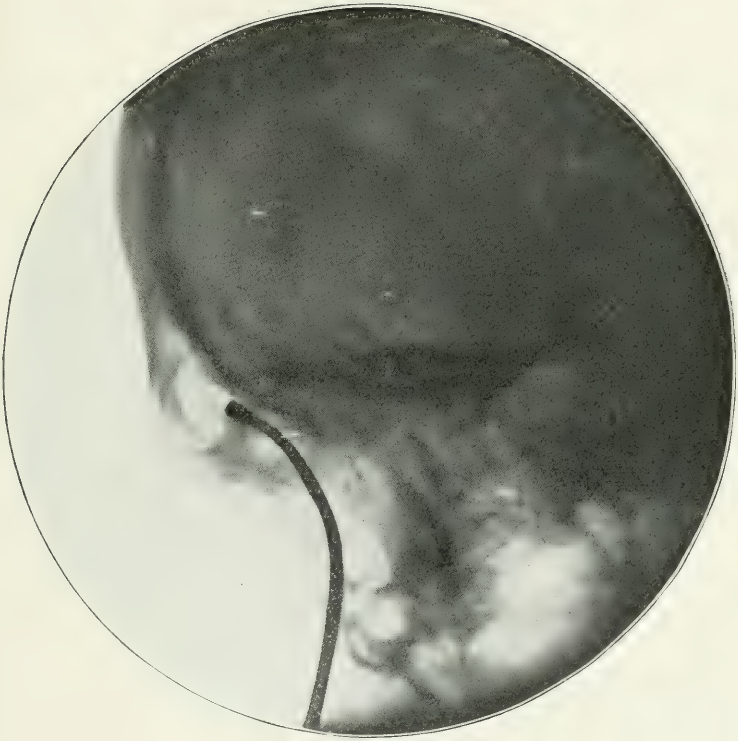
CASE 1.
Front view—Eustachian catheter in right frontal sinus.



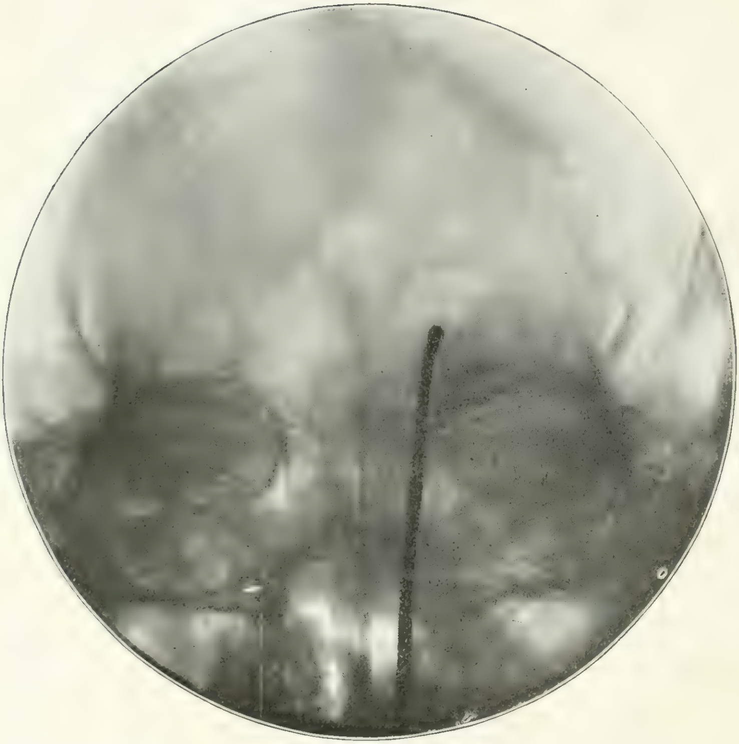
CASE 1.
Lateral view—Eustachian catheter in right frontal sinus.



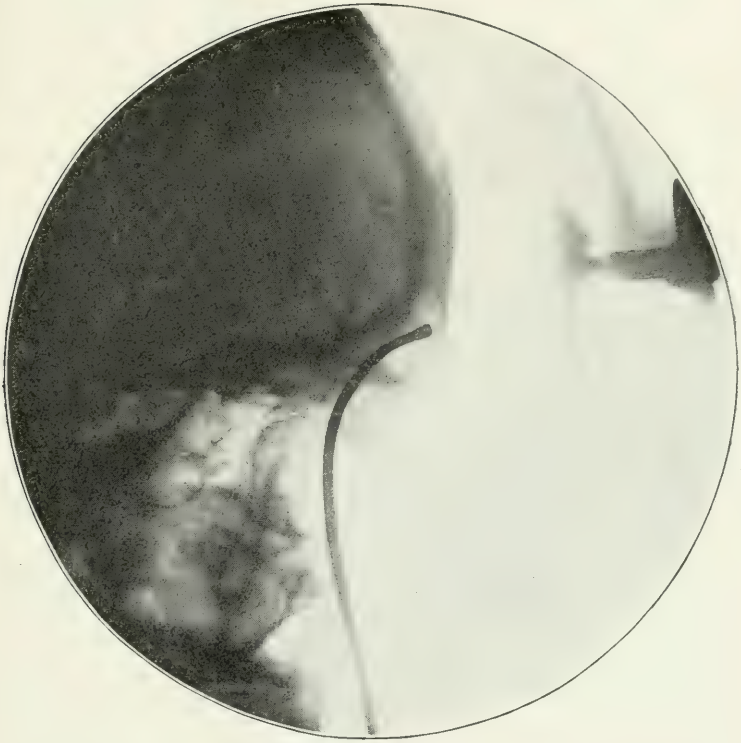
CASE 2.
Front view—Eustachian catheter in left frontal sinus.



CASE 2.
Lateral view—Eustachian catheter in left frontal sinus.



CASE 3.
Front view—Eustachian catheter in left frontal sinus.



CASE 3.
Lateral view—Eustachian catheter in left frontal sinus.

LXV.

A CASE OF EXTENSIVE OSTEOMYELITIS INVOLVING THE SUPERIOR MAXILLARY, MALAR, FRONTAL, ETHMOID AND SPHENOID BONES.*

By Ross Hall Skillern, M. D.,

The patient, P. S., age 28, came under my care on September 18, 1919, with the following history:

About the middle of July had an intranasal operation (spur of septum). One month later pain appeared in the right infraorbital region, radiating downward into the teeth. A diagnosis of purulent maxillary sinusitis was made and appropriate treatment instituted. Condition steadily became worse, and on August 29th an intranasal operation was performed on the maxillary sinus, which consisted of resecting a portion of the internal walls below the inferior turbinate. Slight relief for six days, when relapse occurred with edema over canine fossa, lacrimal region and inner canthus of eye.

On September 7th, the frontal sinus was opened through the inferior wall and drainage with gauze and rubber installed. Quantities of thick pus were evacuated. Patient did not improve and ten days later was received by us in the following condition:

Completely prostrated from long trip (Havana), having been quieted with large doses of morphin during journey. Intense pain in supra and infraorbital region. Face suffused and greatly swollen on right side both above and below eyes, and the eye itself closed from edema of lids with conjunctiva prolapsed from external canthus. Edema over frontal bone extended upward about five centimeters. Fistulous opening in floor of right frontal sinus at root of nose, containing rubber drainage tube, which was discharging considerable purulent secretion. In infraorbital region swelling intense, red and shiny, but no signs of fluctuation. Gums on upper right spongy, bleeding and bathed in pus. Marked bulging outward of canine fossa. Exquisite tenderness over all these areas. Profuse purulent discharge from right nostril and postnasally. Fever fluctuating between 100 and 102 degrees, pulse 90, respiration 26, and patient in a septic condition. Urine examination negative, blood 21,600 leucocytes (see laboratory report No. 1), X-ray taken (see laboratory report No. 2).

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*Read at the annual meeting of the American Laryngological, Rhinological and Otological Society, June 3, 1920.

Instant radical surgical interference was, of course, indicated, so on the following day the maxillary sinus was opened through the canine fossa. The bone was softened and was easily removed, some portions fairly crumbling away when seized with the forceps. A quantity of thick and extremely fetid pus oozed out when the sinus was penetrated. A wide area of softened bone was removed until a large opening had been made into the sinus. On attempting to sound the cavity, it appeared to be filled with a soft, friable mass resembling disorganized brain tissue, which was more or less adherent to the walls. Malignancy was at once suspected, but careful examination, with the probe and finger, proved that the mass was not incorporated into any of the bony walls. The mass was removed piecemeal with the forceps and curette, a portion with the underlying bone being reserved for microscopic examination (see laboratory report No. 3. (Profuse hemorrhage accompanied all steps of the operation, due to the intense congestion of the parts. The cavity was thoroughly curetted to the bone, the nasal wall removed almost entirely and the alveolar fossa to the roots of teeth which were themselves removed (to canine). The softened bone of the alveolar process was resected until apparently healthy osseous structure was encountered. Cavity filled with iodoform gauze brought out through nose. The fistulous opening into frontal sinus was probed and enlarged by the operation, which had already consumed two hours and had to be terminated owing to the condition of the patient.

On the following day the temperature dropped to normal, but the infraorbital pain continued, although with diminished intensity. This condition lasted about ten days, the patient complaining more particularly of pain at night, preventing sleep. During the day he was for the most part fairly comfortable. In the meantime blood tests, including Wassermann, were again made (see laboratory report No. 4).

On October 1st, ten days after operation, the temperature shot up to 101°, and from that time the patient ran a septic temperature. The opening into the maxillary sinus through the canine fossa did not heal, but discharged large quantities of fetid pus. Localized areas of tenderness appeared over the face, notably over the infraorbital ridge and at the alæ of the nose. The alveolus where the tooth roots had been embedded was very sore, and the canine teeth felt unduly sensitive. Examination showed the alveolar process to be loose, which after slight manipulation was removed in two large sequesters (Nos. 1 and 2), the posterior being a portion of the antral floor, so that free communication now existed between the oral cavity and maxillary sinus. The septic temperature, however, continued and the general condition of the patient showed no improvement, so on October 20th the incision over the frontal sinus was enlarged and the left sinus opened. The disease had made great ravages in this region, both nasal bones with a portion of their attachment on the frontal bone came away in one sequester, the bone being badly necrosed (No. 3). The infection had penetrated the septum between the frontal sinuses, so that the anterior walls of both cavities were involved as well as the orbital wall of the right frontal sinus. The incision was extended across the root of the nose and through the eyebrow on the left side. The anterior wall of both sinuses, together with the septum, was removed and the cavities thoroughly curetted until all softened bone was apparently eradicated. Cavities packed with iodoform gauze and wound only closed at edges. The patient rallied, but still showed the septic temperature even more pronounced, and complained continually of feeling cold and inability to sleep at night.

The temperature gradually began to assume more normal characteristics, but the patient's condition still remained unsatisfactory. The swelling around the eyes and over maxilla appeared to be diminishing (see ophthalmologic examination), not so general nor tense, but certain small areas of great tenderness, notably directly under right eye and on the right side of nose, made their appearance. An incision was made under the right eye and a quantity of pus evacuated, the underlying bone being found rough. This healed in a few days. The patient became progressively weaker, and the headache, which extended from the occiput to the frontal bone, while more or less quiescent during the day, reappeared every evening with such intensity that it was difficult to repress him in his bed. Morphin, even in ½ grain doses repeated, had little influence upon these paroxysms of head pains. It was perfectly evident that the case was steadily going from bad to worse and that something radical was urgently needed in order to bring about a change, if such a thing were in any way possible. In this forlorn hope, on the 17th of November, the supraorbital incision was extended downward along the nose, and on investigation it was found that the entire infraorbital portion of the malar was lying loose as a sequester, together with the ascending process of the superior maxillary. These were removed with the ethmoid cells and patient returned to his room. He reacted badly, the temperature rising above 103°. This condition persisted until he finally died on the 19th of general septicemia. Autopsy not permitted.

The particularly significant and instructive aspect of this case is the danger of applying inadequate therapeutic measures in the early stages of serious infection, particularly after it had begun to show a predilection for osseous involvement.

OPHTHALMOLOGIC REPORT.

When I first saw Mr. P. S., Oct. 20, 1919, there was marked proptosis of the right eye, with greatly swollen lids and marked induration of the same at the lower outer angle of the orbit. There was marked limitation of upward and downward motion: lateral motion good. Pupil was 3 mm. and responded well to light. The ophthalmoscope revealed a slight blurring of the edges of the optic nerve and overfullness of the veins. Vision was apparently good, fingers being counted without difficulty at 6 meters and the patient being able to tell the time on a watch held at the ordinary reading distance. The left eye was normal.

An incision was advised over the indurated eye, and on account of the condition of the surrounding sinuses and the orbital cellulitis a Killian operation was also advised. Notwithstanding the absence of pathologic evidence of malignancy, the opinion was given that the possibility of there being a malignant growth in the orbit must be taken into account.

On Oct 28, 1919, orbital condition much improved, Dr. Skillern having made a free incision and having given exit to a large quantity of pus at the lower outer angle of the orbit. Ocular movements somewhat freer; proptosis as before. No further ophthalmoscopic changes.

On Nov. 8, proptosis not so marked; ocular movements much freer, except below. Marked induration in floor of orbit; hard swelling continuous with the orbital rim being distinctly palpable. Vision as before. Ophthalmoscopically, edges of nerve perhaps a little more blurred and veins slightly fuller.

On Nov. 14, orbital condition improved. Exophthalmus not so marked. Ocular movements freer. Nerve not so blurred nor retinal veins so full as when last seen. Indurated area in the lower part of the orbit apparently not so pronounced. Now but slight swelling of lids and but little engorgement of the conjunctival blood vessels. Vision as before.

Laboratory Report No. 1. Blood, Sept. 19, 1919.—Hemoglobin, 95 per cent; erythrocytes, 4,170,000; leukocytes, 21,600; color index, 1 plus.

Laboratory Report No. 2. X-ray examination. Sept. 18, 1919.—Frontal sinuses negative. There is complete clouding of anterior ethmoids and antrum on the right side.

The posterior sinuses also appear to be clouded (see plates in stereoscope).

Teeth are negative. (Subsequent experience proved all upper teeth on right side badly infected.)

Laboratory Report No. 3. Tissue and Bone. Sept. 19, 1919. —Specimen consists of fragments of tissue, pale red in color. Fragments number five, two of which exhibit a fibroosseous nature. Three remaining pieces are hard and fibrous, apparently containing no bone, and are quite irregular.

Histology.—Softer sections are made up mostly of fibrous connective tissue, loosely and densely arranged. Along one border of two sections mucosa is observed, made up of stratified ciliated epithelial cells on a definite basement membrane. Below this, connective tissue exhibits an extensive exudate of polynuclear and mononuclear leukocytes. Along other borders no mucosa is apparent, granulation tissue occurring, with blood vessels of new formation.

No evidence of sarcoma is seen in these sections.

Diagnosis: Chronic inflammatory tissue with areas of hemorrhage.

REPORT OF DECALCIFIED SECTIONS.

Sections are those of compact bone. Haversian canals surrounded by lamellæ, containing canaliculi, are quite definite.

Along one border there is resorption of bone, beginning in the Haversian canals, which in some places is quite marked.

These canals in which absorption is progressing are filled with an exudate of polynuclear leucocytes and some osteoblasts.

No evidence of malignancy is apparent.

Diagnosis: Bone suppuration (beginning) with slight absorption.

Laboratory Report No. 3a. Removed Tissue. Oct. 20, 1919.—Specimen consists of five tissue fragments; largest is 2.0 cm. by 1.5 cm. by 0.4 cm. Smallest is 7.0 mm. by 5.0 mm. by 3.0 mm. All are irregular. Color pinkish, mottled with red. Most of specimens contain bone at some part.

Histology.—Sections of largest mass contain no bone, mostly made up of fibrous connective tissue, fibers of which course in all directions; along one margin stratified columnar epithelial cells are present, with a suggestion of cilia. Along another border extensive leukocytic infiltration is present, most cells of which are polynuclears. Hemorrhage has occurred in certain areas of this.

Nearly all of smaller tissue masses reveal osseous tissue in sections. Fibrous tissue is extensive, and peripheral areas show leukocytic aggregates, most cells being polymorphonuclears.

In general sections resemble those studied from former tissue blocks.

Diagnosis: Granulation tissue with hemorrhage and necrosis. Chronic osteomyelitis.

Laboratory Report No. 4. Blood. Oct. 20, 1919.—Hemoglobin, 78 per cent; erythrocytes, 3,150,000; leukocytes, 20,000; color index, 1 plus.

Laboratory Report No. 5. Smears. Oct. 28, 1919.—Large number of streptococci; few pneumococci.

Laboratory Report No. 6. Blood. Nov. 4, 1919.—Hemoglobin, 89 per cent; erythrocytes, 4,100,000; leukocytes, 15,000; color index, 1.

Laboratory Report No. 7. Blood. Nov. 13, 1919.—Hemoglobin, 87 per cent; erythrocytes, 3,900,000; leukocytes, 13,200; color index, 1 plus.

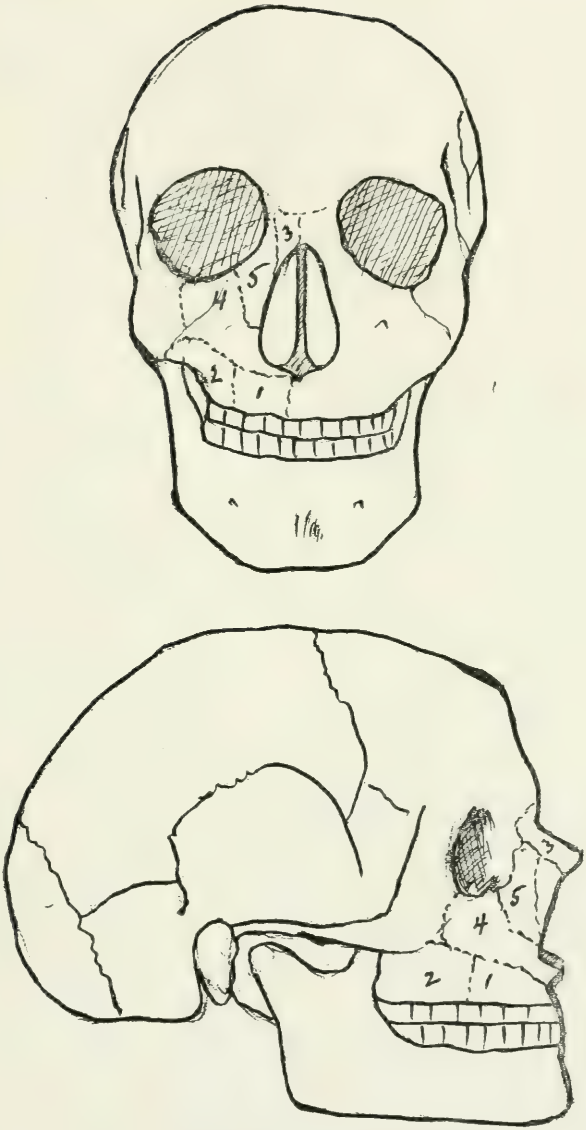

Fig. 1. Showing bone involved.

LXVI.

OBSERVATIONS ON THE MANAGEMENT OF TUBORRHEA. REPORT OF A SERIES OF TWENTY-FIVE CASES.*

By H. I. Lillie, M. D.,

SECTION ON OTOLARYNGOLOGY, MAYO CLINIC,
Rochester, Minn.

It is not generally recognized that the nose blowing habit and nasal pathology, other than suppurative processes, are causative factors in the continuation of tuborrhea in adult patients. By a tuborrhea is meant, in contradistinction to the suppurative processes within the middle ear and appendages, the tubal type of discharging ear which usually follows the acute suppuration in which a permanent patent perforation has resulted. The patient is not caused much discomfort, but the discharge is almost continuous.

Many admirable articles have appeared during the past decade showing the association of nasopharyngeal disease processes with suppurative otitis media, particularly in children. Barnhill, in discussing Reik's paper, called attention to the fact that not enough importance has been placed on the nose blowing habit as a primary causative factor of the acute inflammations of the middle ear. Patton suggested that 75 per cent of adult patients with a running ear have septal deflection on the same side. Murray says that "the clinical relationship of diseases of the middle ear to diseases and abnormalities of the nasal passages must be considered an indirect rather than a direct one. . . . An obstructive lesion situated low down in the nostril may so interfere with the expired air that the nasal secretions accumulate, and may give rise to a nasopharyngitis, or a violent expiratory effort in blowing the nose may drive the infected secretion into the eustachian tubes and cause involvement of the middle ear."

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*Presented for publication April 23, 1920.

He is inclined to believe that processes other than suppurative are not real factors.

Kerrison writes: "If we can satisfy ourselves that the discharge is simply the logical product of exposed mucous membrane or healthy granulation tissue, and that there is no evidence of an active suppurative process involving the bone itself, we should not be too ready to interfere with nature's method of conservatism." He suggests that an attempt be made to close the perforation and any nasopharyngeal complication cared for. To close a perforation, however, is frequently impossible. There is a large group of old cases of otitis in which the perforation is patent, and the middle ear epidermitized and dry.

Yankauer suggests that part of the function of the drum membrane may be protection to the middle ear from both the external and nasopharyngeal sides. His hypothesis is that if the connection between the nasopharynx and middle ear—that is, the eustachian tube—were closed by artificial atresia, in a large percentage of cases the suppurative process in the middle ear would become more amenable to treatment. Yankauer described a method of closing the tube which in certain cases has been successful and has prevented radical operations.

A timely discussion by Brubaker of the physiology of sneezing has recently appeared. The lower animals seldom have suppurative diseases of the ear and are infrequently deaf. Otitis media suppurativa acuta and labyrinthian involvement are occasionally experimentally produced by inoculation. The condition is metastatic. The only means an animal has of clearing the nose is sneezing. Man is prone to close off one nostril, however, and use great force in the endeavor to clear the obstructed side. The obstruction may be anatomic or physiologic, or a combination of both. If the obstruction is considerable, blowing in this manner completes the Valsalva experiment; in case there is a patent perforation in the drumhead the secretions are easily forced through the tube into the ear, since there is no column or air pad in the ear to resist the force. If the nose is blown without one nostril closed there can be no such pressure in the nasopharynx and consequently the force is usually not sufficient to drive secretions into the ear. This is a clinical obstruction met with repeatedly in patients with what we call the "nose ears." In man both nostrils react to a sneeze at the same time. In animals the nasal orifice or eustachian tube lies relatively high in the epipharynx and is thus not so liable to be affected. This may be an important reason why animals are seldom affected.

Clinically "nose ears" or "tube ears" are quite readily recognized. There is usually an anterior perforation filled with mucopurulent secretion, frequently showing air bubbles, without appreciable odor. Occasionally a low grade involvement of the middle ear is found. It is not infrequent—in fact, quite the rule—that suppurative processes within the middle ear subside under well directed treatment when the infection in the tube is removed.

The history of the ear trouble is quite uniform. The onset is during childhood, after which there is more or less constant discharge, with occasionally quiescent periods, but the discharge is always greatly increased if the patient has a "cold in the head" or if the weather changes and affects the nasal membranes. The increased secretion coincident with acute rhinitis and physiologic activity incident to weather conditions causes the patient to blow the nose more frequently, and usually with great force, and if the nostril is not cleared easily, this completes the vicious cycle. Later, as the nasal condition resolves, the ear discharge becomes less.

ANALYSIS OF TWENTY-SIX CASES.

The group on which this report is based consists of 26 cases which have been observed by the writer. There were 20 men and 6 women, ranging in age from 20 to 54. Seventeen were in the third decade, 10 in the fourth, and 3 were more than 40. The initial causative factors in the process were as follows:

	Cases
Scarlet fever	8
Colds in the head	6
Measles	3
Swimming	2
Operation on the nose	1
Unknown	6

In all but one case the trouble started in early childhood.

Scarlet fever is ordinarily looked upon as the causative factor in more serious diseases of the ear; it is interesting that in this group it was the cause of the largest number. The perforation in cases of scarlet fever, when the rupture is spontaneous, is generally larger and less likely to heal because of the destructive nature of the disease process than in a case of ordinary infection.

It has always been my impression that physicians and the laity are too lax about treating earache in children, and that if the drum were opened earlier and more frequently, before so much intratympanic destruction takes place, a smaller number of cases of otitis media would need treatment later.

Contributing Factors After Onset.—The histories were quite uniform in that there was constant discharge of varying amounts and a marked tendency for it to increase with "colds in the head" or changes in the weather. The odor was offensive in few and in those it was due to neglect. The constant annoyance and inconvenience caused the patient to seek relief. All the patients were in the habit of blowing the nose forcibly because they could feel the air force the discharge out of the ear, which they had been told was desirable. A few purposely valsalvalized themselves for this latter reason.

Treatment After Onset.—Simple cleansing methods were used by most patients—that is, irrigation of the canal with various solutions. Two patients had had the socalled simple mastoid operation a long period after the onest and two had had the radical operation. Six had been tonsillectomized as a therapeutic measure. One patient had been constantly catheterized. Six patients had had the radical operation advised. This seems particularly significant. Many of the patients had never consulted an otologist.

EAR FINDINGS.

	Cases
Anterior perforation with mucopus	13
Central perforation without evidence of caries	7
Postinferior perforation with mucopus and granulations	3
Effect of radical operation with open tube	2
Evidence of attic disease plus condition in tube	1

In this group there was only one case in which we considered radical measures, and not without first giving the patient the "test of treatment." The condition in the ear at the time of examination in the clinic was not serious enough for concern in any of the other cases. The radical operation had been advised elsewhere in six cases. Immediately before coming to the clinic one patient with a large central perforation with healthy granulation on the promontory had been advised elsewhere to have a radical operation. Our opinion and treatment in this case were different, and the final result was satisfactory. One and one-half years after operation the patient was in good condition. Ordinarily a patient in this condition would be told to "go away and forget it and keep the ear clean." Such advice, however, does not satisfy all patients. The inherent danger is not marked, but the annoyance is considerable.

NOSE AND THROAT FINDINGS.

	Cases
Septal deflection with obstruction (varying amounts)	15
Pharyngitis, granular	6
Hypertrophic rhinitis	7
Infected tonsils	6
Previous tonsillectomy	6
Previous turbinectomy	1
Condition of nose negative	3

It will be noted that no patient had any suppurative process such as sinusitis. The septal deflection was the finding which in these cases proved to be pathologic for them. It is true that there is a large group of cases with septal deflection, with varying amounts of objective obstruction, in which there is no subjective complaint, but this does not mitigate the fact that what is pathologic for one patient is not pathologic for another, no matter how severe the obstruction. Few of the patients knew that they had any unusual condition within the nose. In most instances the nose had not been examined previously. Adenoids were not recorded in any case, although a nasopharyngeal examination was made routinely in all.

TREATMENT.

	Cases
Correction of the nose blowing habit	8
Correction of the nose blowing habit and local treatment	3
Correction of the nose blowing habit and operation on the septum	4
Correction of the nose blowing habit, operation on the septum and local treatment	5
Correction of the nose blowing habit, operation on the septum, local treatment and tonsillectomy	2
Correction of the nose blowing habit, tonsillectomy and local treatment	1
Correction of the nose blowing habit, operation on septum, Yankauer procedure and local treatment	1
Correction of the nose blowing habit, operation on the septum, Yankauer procedure and radical operation	1
Correction of the nose blowing habit, local treatment, Yankauer procedure and radical operation	1

By correction of the nose blowing habit is meant instruction of the patient in blowing the nose without closing either nostril. In eight patients who have learned to blow the nose properly the process became dry without other treatment; one of the patients had been advised to have a radical mastoid operation. Local treatment consisted in mechanically removing the secretion with cotton applicators or suction; fluids were avoided if possible. This was followed by drying the cavity with air, instilling boric acid and alcohol drops solution and again drying with air. It will be noted that there were thirteen operations on the septum, one-half the number of cases of the group. In one case it will be observed, the Yankauer tube instrumentation was required before the ear became dry. In one of the two cases in which the radical operation was required a previous radical operation had been performed elsewhere, but there was a continuous tuborrhea and the patient was very apprehensive. The tube in this case was so large that the largest Yankauer curette was admitted easily. There were a number of hypotympanic and tubal cells which had not been opened previously. The final result was satisfactory; the patient has been examined several times since dismissal and the ear found to be dry. In the other case in which the radical operation was done all conservative measures were first used. The patient remained under observation about eighteen months; the radical operation was then performed. Hypotympanic and tubal cells were found in this case also. The result was satisfactory. There were four cases in which the habit of forcefully blowing the nose and the deformed septum were corrected without the use of local treatment. One of the patients had been advised elsewhere to undergo the radical operation. He had consulted a well known otologist, who scoffed at the idea that correcting the septum would have any effect upon the ear. This is the case which aroused my interest in the group.

The radical mastoid operation had been advised elsewhere in six cases, but not in the two cases in which we operated. It will be recalled that this group is made up of adult patients with tuborrhea who ordinarily are dismissed with the advice that treatment is unnecessary, but in whom the ear frequently can be dried up. In the case in which attic disease was a complication of the tuborrhea the ear has been much improved, but at two subsequent examinations evidence of an active attic process was found. This patient has not been able to remain under observation.

The ear in cases of tuborrhea becomes dry in a strikingly short time, as short as five days in the patients whose definitely fault ynose blowing habit is corrected, and nasal obstruction on the same side as the involved ear removed.

Exacerbations have been observed in a few patients with tuborrhea during an acute rhinitis, but the discharge has subsided without other measures than care in blowing the nose.

CONCLUSIONS.

1. Tuborrhea is frequently the result of the habit of incorrectly blowing the nose.

2. Pathologic conditions other than suppurative processes, particularly anterior nasal obstructions in adult patients are indirect causative factors.

3. Frank inflammatory processes in the nasopharynx were not observed in the twenty-six cases studied.

4. Clinical classification of suppurative conditions of the middle ear is important.

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LXVII.

MENINGITIS DUE TO FRONTAL SINUS SUPPURATION, WITH A REPORT OF THREE FATAL CASES.*

By Ralph Butler, M. D.,

Philadelphia.

There is no more important phase of rhinology and none which is worthy of more serious thought and study than that of inflammation of the nasal accessory sinuses and their serious complications. Our knowledge in regard to the treatment of sinusitis leaves much to be desired, and it seems advisable to report our successes and still more our failures, so that, eventually, evidence may be at hand for the drawing of correct conclusions in regard to the prevention and cure of dangerous complications.

Considering the vast number of cases of sinus suppuration which are being treated, or are getting on without treatment, the number of reports of intracranial involvement from them are relatively few, and in searching the literature one is impressed by the number of intracranial cases of otitic as compared with those of nasal origin. That these complications of sinus inflammation are not common is borne out by statistics. Treitel[1] reported from the Berliner Pathologischen Institute that he found but one case of meningitis and two cases of brain abscess from frontal sinusitis in 6,000 autopsies, while Pitt,[1] in 9,000 consecutive autopsies at Guy's Hospital, in the years 1869 to 1888, found but one case of rhinologic brain infection and that was an abscess in the frontal lobe. However, the thoroughness with which he studied the sinuses has been questioned. More recently, in 1909, Bruhl[2] states that in an observation of 35,000 nose, throat and ear cases during the previous ten years, he saw a great many otitic fatalities from pyemia, brain abscess and meningitis, and only one case of intracranial disease from frontal sinus suppuration, while Jansen,[3] with an operative experience of 800 cases, reported three of purulent meningitis, without operation, about six of large extradural abscess and one of serous encephalomeningitis. In the same year Gerber[4] published an exhaustive report of frontal sinus complications collected from the literature, in which he tabulated 51 cases of meningitis without brain abscess, six of which had had sinus thrombosis; and 65 cases of brain abscess, 27 of which also had meningitis and two had thrombosis. In 1913, Boenninghaus[5] was able to collect only five additional cases of purulent meningitis due to frontal sinus suppuration, thus bringing the total to 56. Since that date we have found five more cases, the references to which are included in the bibliography of this paper—6, 7, 8, 9 and 10. Some of the recent foreign literature has been inaccessible because of the war, and no doubt unreported cases have occurred.

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*Read at the meeting of the American Laryngological Association, May 29, 1920.

Meningitis may complicate either chronic or acute sinusitis, is more common in the male sex and during the second and third decades. Gerber[4] reports three under ten years of age and the same number over sixty years. It usually starts over the silent area of the brain, and the symptoms may be obscured by those due to the neighboring sinusitis or the orbital complications. Usually it runs a rapid course and terminates fatally within five days, although the symptoms may be intermittent or the course prolonged. In one of our cases, herein reported, the pathologist estimated that localized meningitis had been present for six months. In this case both fever and leukocytosis were absent.

The infection may be transmitted through a congenital or a carious defect in the posterior wall of the sinus, through the veins or lymphatics, by infection of the diploe or by the formation of an osteomyelitis.

In 1913, Zwillinger[11] demonstrated that colored fluid, injected into the perimeningeal lymph spaces, could be recovered in the lymphatic plexuses of the mucous membrane of the frontal sinus. Furthermore, it has been shown that the veins of the sinuses communicate with each other and through the bones with the meninges and the cranial sinuses. The relative or absolute closure of the nasofrontal duct may be a factor in some cases. It has been stated that the larger the frontal sinus the greater the danger of intracranial complications.

After purulent leptomeningitis has developed, the prognosis is very bad. Only three of Gerber's fifty-one cases recovered and two of these were serous meningitis. A few cases of purulent meningitis have recovered—e. g., Beck[12] reports the cure of a case of otitic origin in which pneumococci were found in the cerebrospinal fluid. The Haynes operation was performed in this case. There is considerable evidence to show that the mortality has been increased by operations on the sinuses—e. g., Boenninghaus[5] reported a mortality of ten cases following 375 Killian operations, or two and two-thirds per cent. He collected fifteen cases of death from intracranial complications which were the direct result of the Ogston-Luc operation on the frontal sinus. Four of these cases died from meningitis in from two to six days after operation, one from subdural abscess and sinus thrombosis eight days after operation, eight from osteomyelitis in from seven weeks to two years after operation, and two from brain abscess. In 1909, Hajek[13] reported two postoperative fatalities and stated that Gerber compiled a series of thirty-six. These statistics are by no means conclusive, as many cases have not been reported—e. g., Hajek speaks of six cases reported privately.

As there is considerable operative risk, the cosmetic results are not always satisfactory and complete cure is uncertain, many surgeons hesitate to do a radical operation unless intracranial infection is suspected or the bone is diseased. Even conservative surgeons agree that one must not hesitate beyond this point.

The following case illustrated the value of even a late operation: About two months ago I operated on the left frontal, ethmoidal and maxillary sinuses of a 14-year-old boy who had marked proptosis of the left eyeball. On operating we found the dura exposed in the ethmoidal and frontal regions with a local meningitis. The roof and inner wall of the orbit were largely destroyed, and staphylococci were found in pure culture. The patient has shown no evidence of extension of the intracranial involvement. The Wassermann test was negative.

The results were not so fortunate in the following cases:

Case 1.—On December 18, 1918, Dr. L. asked me to see his 14-year-old son, who had been suffering for about two weeks from an acute inflammation of the left frontal sinus with swelling and tenderness. He had had an attack of influenza during the latter part of September, from which he seemed to recover, with the exception of a condition of malaise. He became exhausted on the slightest exertion and did not look well. Previously he had been a normal, healthy boy.

As I saw him in his home, my examination was incomplete. However, there was neither tenderness nor swelling over the sinuses. the postural tests were negative and there was no abnormal scretion in the nose or throat. I suggested a blood count, an X-ray examination of the sinuses and examinations by an ophthalmologist and a neurologist. The roentgenologist could not determine whether the left frontal sinus was absent or full of exudate. The blood count showed 20,000 leucocytes. The neurologist, Dr. William G. Spiller, examined him two days before he died and gave a negative report.

I urged his father to send him to the Lankenau Hospital for study, as the cause of the leucocytosis and weakness had not been determined. He was admitted to the hospital during the evening of December 20th, but I was not notified of his presence until the following forenoon, when I received a telephone message that he had become unconscious the previous evening and showed signs of meningitis. Drs. Spiller, Page and I saw him in consultation at 2 p. m. on the day after admission. He was comatose, the neck was stiff, the pupils did not react to light and accommodation. The left one was widely dilated, the right contracted, and there was a hemorrhage in each fundus. The examinations of the ears, lungs, heart and abdomen were negative. The right arm and leg showed spasmodic twitching. The Babinsky was present in the right foot, both patellar reflexes were slightly increased. Kernig's and Brudzinski's signs were positive.

The blood count showed hemoglobin, 90 per cent; red blood cells, 4,870,000; white blood cells, 26,300; polynuclears, 72; lymphocytes, 11; L. mononuclears, 10; transitionals, 7. The cerebrospinal fluid was cloudy and showed a count of 226, mostly red cells, and Gram positive diplococci resembling pneumococci. On admission his temperature was 99, pulse 60, respiration 20—the following morning 100.5, 70 and 20. A second X-ray examination showed an exudate in the left frontal sinus. All agreed that the sinus should be opened. This was done, and it was found to be filled with thick brown fluid. The mucous membrane was moderately inflamed, the walls were intact, and the nasofrontal duct was patulous. The patient required little ether and the pulse and respiration were normal during the short operation. While the wound was being sutured the patient suddenly stopped breathing, probably from paralysis of the respiratory center. Efforts at resuscitation failed. No autopsy was obtained.

Case 2.—T. D., age 21 years, native of Poland, came to the eye clinic at the German Hospital, September 30, 1908, and was referred to the nose and throat department by Dr. W. T. Shoemaker.

The patient gave the following history: He had been kicked by a horse above the right eye 14 years ago. Three months later he noticed a swelling over the inner end of the eyebrow, which slowly increased in size. There were no symptoms except moderate bilateral "dizzy" headaches in winter time and loss of the sense of smell on the diseased side.

Examination showed a swelling about as large as a pigeon's egg along the inner end and extending below the right eyebrow. There was no tenderness. The periphery of the elevation was hard and bonelike, the center doughy and cystic.

The appearance of the inside of the nose was practically normal except that there was crowding of the middle turbinal on the right side caused by the moderate inward bulging of the external wall of the nose. There was some yellowish nonfetid secretion in the left anterior nasal chamber and in the nasopharynx. Sense of smell was lacking on the right side. Transillumination showed both frontals dark. The skiagraph was unsatisfactory. The eyes were normal.

Diagnosis of mucocele of the frontal sinus was made.

October 2nd, after removing the anterior end of the middle turbinal, we opened the frontal sinus and found the cavity very large, measuring two inches in the anteroposterior as well as the lateral diameter. The cavity was filled with thick, ropy mucus. There was no communication between the sinus and the nose, therefore a very large passage was made and a rubber drainage tube was inserted, one end being left in the incision in the eyebrow while the rest of the incision was closed with sutures.

The patient did fairly well, and the drainage tube was removed from the wound in the eyebrow at the end of a week, and ineffectual efforts were made to keep the internal portion in situ. However, in spite of persistent attempts to keep it open with bougies and tubes, the artificial duct closed and the swelling reappeared.

On October 29th, I reopened the wound in the eyebrow and found the sinus nearly filled with flabby granulations and some thick mucus. I then inserted a gold tube with a large flange, treated the granulations with silver nitrate and closed the external wound. The patient made an uninterrupted recovery with marked improvement in his mental condition.

Four years later, December, 1912, he came to my office with an acute purulent infection of the right frontal sinus with drainage of pus through and about the gold tube which was still in place, surrounded by granulation tissue. After a few treatments he improved and then disappeared from my observation for another four-year period when, in the summer of 1916, he returned with a recurrence of acute symptoms. He refused to go to the hospital in spite of urgent advice, and I did not see him again until June, 1917, at which time pus was coming through the upper eyelid and the tube was badly blocked. He still refused to go to the hospital and failed to report for treatment.

About a month later I was called to his home by his family physician and found him with a typical attack of meningitis, from which he promptly succumbed. It was impossible to do even a lumbar puncture in his squalid surroundings and in the presence of a dozen or more of his Polish friends, and the family refused to allow him to be taken to a hospital.

Unfortunately an autopsy was unobtainable.

Case 3.—F. S. was admitted to the Polyclinic Hospital December 9th, 1912. He was large, well proportioned and looked much younger than his age of 77 years. During the past seven years he had been a night watchman and previously a glass-blower. His chief complaint was loss of vision and a discharge above the right eye. For the past two years he had

had a bilateral, intermittent, creamy yellow anterior nasal discharge. During the last six weeks he had had three attacks of swelling of the right cheek and bilateral swelling of the eyelids. During the last attack he used poultices, following which a fistula formed over the right eye, and through this there had been a discharge of pus. Three weeks previously he had had polyps removed from the right nostril. He had never had pain. With the exception of a loss of forty pounds in weight during the last two years, dyspnea on exertion and occasional swelling of the feet, the rest of the general history was negative. He denied venereal disease.

The examination showed tenderness over the floor of the right frontal sinus with induration of the tissues of the upper part of the right orbit and a supraorbital fistula extending into the frontal sinus from which pus was draining. Both nostrils were filled with pus which could be traced on the right side to the middle meatus. The right middle turbinate was large and polypoid. The view of the left naris was obstructed by a deflected nasal septum. There was no pus in the pharynx and the choanæ were free. A culture of the pus was sterile. The X-ray examination showed marked clouding of the right frontal and roughening of its median wall, with slight clouding of the right antrum and of the ethmoids on both sides.

On the 11th of December, 1912, the right middle turbinal was removed and pus was washed from the right antrum.

Dr. Reber reported the external ocular muscular movements good, incipient cataract, haziness of discs and retinae with overfilling of veins and arteries in both eyes but more marked in the right one. He advised operative interference to preserve the integrity of the right eye.

The blood count was normal, with 5,520 leucocytes. The urine showed a trace of albumin and a few epithelial casts. The temperature and pulse were normal.

December 14th, 1912, eight days after admission, an external operation was performed. The front wall containing the fistula was removed, and the sinus was found filled with pus, the pulsation of which suggested a communication with the brain. The posterior wall was necrosed over an area of about 1 cm. in diameter through which the inflamed dura could be seen and pulsation could be felt. At this point the operation had to be discontinued because the patient was doing badly, and after inserting a gauze drain, he was returned to bed. He seemed to be in fairly good condition the following day, with normal pulse and temperature. The urine, however, showed casts and albumin.

On the third day after operation, the patient became irrational and had one general convulsion which the neurologist attributed to uraemia. His examination showed increased knee jerks, clonus on left, readily exhausted on right. No Babinsky. Marked subsultus of tendon in both arms. Apparently no palsy of arms or legs which he moved voluntarily. Left pupil responded to light—right eye bandaged. Blood pressure, systolic 210, diastolic 80. The patient died during the night of the 17th, apparently from uremia.

The autopsy showed bilateral chronic suppuration of the frontal, ethmoidal and sphenoidal sinuses and of the right antrum of Highmore and chronic suppurative meningitis with secondary atrophy of the cortical substance of the frontal lobes of the brain, estimated to be of six months' duration. Infection probably pneumococcic. Gram positive diplococci.

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LXVIII.

THE TREATMENT OF NASAL ACCESSORY SINUS DISEASE IN INFANTS AND YOUNG CHILDREN.*

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A very essential thing in treating chronic nasal sinus disease in infants and very young children is to have the patients in the hospital or better in a convalescent home adjacent to the hospital. Our convalescent home is arranged for the care of ambulatory cases and the patients in it are not subjected to the rigid rules so necessary in the hospital proper. In the convalescent home the patient is under excellent supervision and the treatment may be given just as efficiently as in the hospital and at the same time the child has every opportunity for play indoors and outdoors, a condition very essential for the proper handling of the more resistant chronic cases. Many of these cases will not become entirely well until a proper fresh air program is instituted. This latter condition might be best secured by keeping the patient at home. I feel, however, that I can only satisfactorily diagnose and treat a child five years of age or younger by hospitalizing it. In the hospital the very best opportunity for examination is given. These patients strenuously rebel at all efforts to examine and treat them. Practically all of our cases are extramural; the patients remain in the hospital and the parents go home. This gives the very best opportunity for study and treatment of the case. The giving of treatments in the absence of solicitous friends or parents is very important.

The treatment of the acute infections of the nasal sinuses in children is usually very simple. The administration of a laxative with rest in bed combined with a proper diet usually is sufficient. An exception is found in cases complicating the infectious diseases. In this instance the acute sinusitis may resist all treatment and extensive chronic disease of the neighboring bone result.

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*Read at the twenty-sixth annual meeting of the American Laryngological, Rhinological, and Otological Society, at Boston, Mass., June 3, 1920.

The treatment of the chronic infections of the nasal sinuses is a different story. While most of these cases yield readily to treatment, many especially the streptococcic infections seem as resistant to remedial and operative procedures as in the adult.

In every case of chronic nasal sinusitis, diseased tonsils and adenoids if present must be removed. In one eighteen months old baby with a posterior cleft after the removal of adenoids the most persistent treatment for two months would not obliterate a hemolytic streptococcic sinus disease. The tonsils were diseased. It was considered unadvisable to remove these before closing the posterior cleft because of the contraction of the pillars of the fauces. As the cleft could not be closed until the sinus disease was cured the tonsils were finally removed. Following their removal the nasal sinus disease rapidly disappeared and the posterior cleft was readily closed.

Eighty per cent of our chronic cases of nasal sinus disease in infants and young children have been cured by the removal of tonsils and adenoids without any other treatment. These favorable results I feel are due in great part to first, the age of the patient excluding long chronicity, and second, the comparative infrequency of nasal obstructive lesions in this class of cases. While nasal obstructive lesions in infancy and early childhood are not common, they, sometimes, are present and are important etiological factors in the production of the sinus disease. In such instances this condition must be corrected.

A warm dry climate has a decided beneficial influence on this condition. We have had one case of hemolytic streptococcic infection that did not yield to treatment until summer. Frequently those who become apparently cured by seeking a proper climate have a recurrence of the trouble on their return to our changeable and rigorous Iowa climate.

Vaccine therapy is often of great benefit. We have used only the autogenous vaccines. In many cases this has been the essential treatment. Our vaccines have been particularly unsatisfactory in the hemolytic streptococcic infections.

Nasal irrigations are used for cleansing purposes. We have used only normal salt solutions. The baby or young child is placed on the side or on the abdomen with the head lower than the body. A fountain syringe is used. The container is not elevated more than eighteen inches above the head. The nose is thoroughly douched. We feel that this is indicated in all casas with much nasal discharge. It is a routine postoperative procedure in all of our posterior cleft and nasal sinus operations.

Coffin's method of treatment using alternately negative pressure and compression has proven to be an excellent adjunct in children that can be controlled. Following Dr. Coffin's recommendation we use with the compression some silver preparation as Silv-Albolene (1-1000). This method is very beneficial in infants that cry, and can be used without much inconvenience.

The Haskins treatment that is applying suction within the nose by means of a rubber catheter is a very valuable procedure. In my judgment the very best local treatment for sinus disease in posterior cleft cases is as follows: With the infant's mouth open cleanse every crevice of the nose with the Haskins catheter. Then brush the meati and turbinates with a ten per cent solution of argyrol or some similar drug. We do this with all of our posterior cleft cases until the nose is clean and remains so. Our percentage of good results following posterior cleft operations has been very much increased by this procedure.

In infants without clefts our favorite treatment is irrigation of the nose followed by cleansing of the nasal chambers with the Haskins catheter introduced through the anterior nares. In children too young to raise the palate and too old to cry this method is of value.

The use of dichloramin-T, two per cent, in chlorcosane after irrigation and drying the nose as suggested by Emil Mayer has been found to be of service. The dichloramin-T does not irritate the most sensitive nose.

When the upper posterior sinuses are diseased the use of three-tenths of one per cent of phenol in petrolatum as suggested by Sluder is often of great benefit. Using a metal syringe with a long flexible cannula this solution should be forced into the superior meatus. In infants a very severe dermatitis of the lip may be caused by this solution. With the cessation of the treatment this rapidly disappears.

When a chronic Highmorian empyema has resisted treatment filling the antrum with ten per cent argyrol introduced with a trochar may result in a cure.

In the more resistant empyemas of the Highmorian antrum ventilation and drainage may be indicated. This can usually but not always be secured without loss of any turbinate tissue. Using a blunt pair of forceps the inferior turbinate is rotated in and up, then with a very small rasp an opening can be made into the Highmorian antrum through the inferior meatus. The inferior turbinate is rotated back to its normal position. Through this opening the antrum may be irrigated with silver nitrate or other solution. This may be done without great difficulty in infants. In puncturing the Highmorian Antrum in infants it is most important to have an X-Ray plate of the sinuses constantly before the operator in order that he may have the cavity exactly located. Extensive operative procedures on the sinuses in infants and young children are but rarely indicated. In those very rare cases where there are ocular or orbital complications: those with extensive bone involvement; those where the sinus infection is causing a severe systemic condition as for instance acute infectious arthritis and the sinus disease persists in spite of thorough treatment with drainage and ventilation of the sinuses; and when it can be demonstrated that an organism capable of causing the systemic condition is present in the sinuses, then extensive operations are justified.

Nasal sinus disease complicating atrophic rhinitis and syphilis we have not found to be much improved by the removal of diseased tonsils and adenoids. The treatment of the sinus disease in these two classes of cases together with the proper local and systemic measures we have found to give very fair results. Especially have we been pleased with the results in the cases of congenital syphilis.

When sinus disease has been apparently cured the cure may be more apparent than real. The nasal disease may disappear and with it the subjective symptoms. Irrigation and culture of the cavities show that they are not healed.

LXIX.

FORTY FOREIGN BODIES IN THE LUNGS, ESOPHAGUS AND INTESTINES.*

By E. W. Carpenter, M. D.,

Greenville, S. C.

This study is presented, first, in the hope that it will impress its readers with their large responsibility in recognizing these cases and the necessity of promptly investigating them; and secondly, to call to their attention the fact that this report is confined to cases in the boundaries of South Carolina.

If one man working quietly in a small community has seen this number of foreign body cases from so limited an area, then there must be a large number of unrecognized cases in our midst. The technic of investigation is difficult and must be learned on the living subject. Much can be done by practice on the human cadaver and the dog, but the problems involved present great divergence when applied to an animated subject.

The mortality in the study and removal of foreign bodies should be very low. The average case incurs absolutely no danger to life if conducted with reasonable care. The end results of the vast majority of cases of foreign bodies when not removed is death, either from mechanical obstruction, erosion into vital structures, direct or indirect infection.

In my experience three foreign bodies have been coughed up, Cases 1, 5, and 36. In the first case this occurred after the child was in a reclining position with the larnyx suspended. In the second case, while the grain of corn was expelled, a minute portion of the husk remained which caused incessant cough for nine days until it was removed. In the third case, a watermelon seed was coughed up four months after being inhaled. I believe that most of the subjects of this study would have died sooner or later if they had been left to their fate.

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*Read in section on Eye, Ear, Nose and Throat, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

The usefulness of per oral endoscopy is not limited to the removal of foreign bodies. There are many obscure conditions which physicians meet in daily practice which could and should be brought into the light of a bronchoscope. Ulcers of the trachea and esophagus, granulations, papilloma, tumors, asthma, aneurisms, abscess cavities, strictures, malignant growths, diverticula, etc., are coming into the clear light of an intelligent diagnosis more and more.

I do not think that every doctor should possess himself of a bronchoscopic outfit, but it is essential that every one should promptly recognize these cases.

SYMPTOMS OF FOREIGN BODIES.

In most cases there is a history of a definite choking spell, varying in intensity from a transient cough or a constant hack to violent attacks of dyspnea. Jackson has truly said that cough was the watch dog of the lungs, but occasionally we find a case which is said not to have coughed after the passing of the first paroxysm. I have noticed in many cases a wheezing which did not bear a definite relation to the size or location of the foreign body.

The nature and size of the foreign body will determine the presence or absence of physical signs in the chest. If the patient is seen early after an irritating substance, like a peanut kernel, has been inhaled, moist rales are heard in the neighborhood of the foreign body. If a longer time has elapsed, both sides of the chest may be filled with moisture. If the offending substance is large enough completely to obstruct a bronchus, then breath sounds are absent in the part of the lung supplied by that bronchus. Sometimes a foreign body may act like a ball valve, permitting air to accumulate distal to it until the cut-off part of the lung becomes tympanitic (see case 14).

After an expert physical study of a chest has been made one is often without definite indications of a foreign body. The study of a case is never complete without an X-ray plate. Often all the above means fail and one has to resort to the scope without having any definite information as to the nature of the foreign body or its location.

ANESTHESIA.

Any child or adult who can be controlled and kept from over-violent resistance should never have a general anesthetic; neither should any patient who has a dyspnea. When a general anesthetic is administered the voluntary muscles of respiration are put out of action, and it is through these muscles that the patient is kept alive in the presence of severe dyspnea.

The most difficult ages to handle are from 6 to 15 years. Often they sulk or are overcome with fright and can not be controlled. Under these circumstances as much chloroform should be used as is necessary to keep the patient quiet. Never push an anesthetic under any circumstance to the stage where the cough reflex is abolished.

In very young infants and children I do not use any anesthetic, not even cocain, unless it be to apply a minute quantity to the depths of the lungs to overcome cough under certain circumstances. In adults 10 per cent solution of cocain is usually sufficient when applied in the larnyx two or three times.

POST-OPERATIVE DYSPNEA.

In this study five cases had to be intubated because of postoperative dyspnea. The reason for this is twofold: (1) Inflammatory infiltration and (2) injury from over large tube, or trauma inflicted by a struggling subject. The obstructing lesion is usually located high up in the trachea.

The more experience one has the smaller the caliber of the bronchoscope he can work through. The larger my experience grows the less I am inclined to open the trachea for the removal of foreign bodies or for the relief of dyspnea. I believe that intubation is a better procedure for the relief of subglottic edema than tracheotomy, when the lesion does not extend beyond the reach of the intubation tube.

REMARKS.

Case 3.—Esophageal speculum revealed pin open and point up. Patient sent to hospital for removal. Three hours afterwards X-ray revealed pin in stomach.

Case 5.—A grain of corn was expelled by coughing 24 hours after inhaling it, but cough, which was constant day and night, continued for eight days. Morphin at night gave but little relief. Thinking to find a fragment of the grain of corn, the patient was scoped, and a small fragment of husk was removed from the secondary left bronchus. Patient did not cough again after leaving the table.

Case 6.—Edema, probably traumatic.

Case 8.—Edema, and bronchitis probably from septic pin, as it had been repeatedly used in a lady's veil and had probably been held in the mouth repeatedly.

Case 13.—Pin was first exposed with long narrow speculum, baby collapsed, respiration and heart stopped and my assistant counseled desistance. I discovered that the speculum had caused the trachea to collapse, thus shutting off respiration. This had never occurred to me before, and I was not on the lookout for it. A small tube exposed the pin after the child reacted, but it slid merrily down into the stomach.

Case 14.—The extreme tympany in this chest and the swollen mucosa around the grain of corn led me to think that the corn had acted like a ball valve, admitting air and imprisoning it.

Case 15.—Edema in this case was probably due to the intensely irritating quality of the peanut oil, or, as Jackson has called it, arachitic bronchitis.

Case 17.—Some authorities do not believe that the heart or respiration is stopped by stretching of the subglottic area, but in this case respiration stopped after passing a tightly fitting tube through this space and was resumed on withdrawing the scope. Through a tracheal incision the foreign body was readily removed and was accompanied by a flood of pus which threatened drowning. This was the first instance where I had opened the trachea for removal of a foreign body, and I should have been content to have left the case alone at this stage. Thinking to encourage healing of the tracheal wound, I decided to slip in an O'Dwyer tube. The edema was considerable and the tube tight fitting. As soon as the tube was seated the heart ceased to beat and could not be aroused. In a few cases since this I have been content to trust to the tracheal wound for breathing and leave it absolutely alone except to keep it scrupulously clean.

Case 20 was one of threatened drowning. I believe the future holds a field of usefulness for the bronchoscope in similar conditions.

Case 23.—Similar to case 17 in respect to cessation of respiration on introduction of scope. After respiration was reestablished I could not persuade a 5 mm. scope to reenter the trachea. Trachea incised, but the trachitis was so intense that a 5 mm. tube would not enter. This was previous to the manufacture of a 4 mm. scope. Another physician attempted to introduce the tube through the high and low route with similar results.

SUMMARY.

Vegetable substance	23
Animal	3
Mineral	13
Not identified	1
Deaths (Cases 17, 19 and 23)	3

TABLE OF CASES.

Name	Age	Object	Location	Time in Situ	Type of Oper.	Result	Complication and Remarks
1. E. S.	8 yrs	Clove	Trachea	3 hrs	High	Cure	The epiglottis was elevated; violent cough expelled clove.
2. J. L.	1 yr	Grain of corn	R. B.	10 hrs	High	Cure	Corn fragile and broke frequently in attempt to extract it.
3. A. B.	18 yrs	Safety pin, open	Esophagus	7 days	High	Recovery	Pin exposed in esophagus; patient transferred to hospital. Dislodged after x-ray and passed into stomach. Recovered in stools 6 days after.
4. R. H.	18 mos	Nut kernel	L. B.	30 hrs	High	Cure	Walnut.
5. W.W.W.	30 yrs	Corn husk	L. Sec. B.	9 days	High	Cure	Grain of corn coughed out in 24 hours. Cough continued and a piece of husk 1½ to 2 mm. removed. The cough ceased promptly.
6. T. J. E.	5 yrs	Watermelon seed	R. B.	3 days	High	Cure	Violently resisted; subglottic edema. Intubated.
7. J. P.	6 yrs	Corn	L. B.	5 hrs	High	Cure	
8. W.	2½ yrs	Straight pin, 1¼ in.	L. B.	24 hrs	High	Cure	Subglottic edema and bronchitis. Intubated.
9. E. B.	7 yrs	Nail, 2 in.	R. B.	30 hrs	High	Cure	
10. P. R.	3 yrs	Lead ball	L. B.	5 days	High	Cure	Large circumference and difficult to grasp.
11. M. L.	20 yrs	Straight pin	Duodenum	3 days	None	Recovery	Located with x-ray. Expelled in 6 days. Complained of pain on swallowing.
12. J. P.	6 yrs	Grain of corn	L. B.	6 hrs	High	Cure	
13. H. P.	7 mos	Safety pin, open, point up	Esophagus	14 hrs	Pushed into stomach. Gastrotomy	Cure	Examination with esophageal speculum caused great shock. Small tube substituted. Trachea collapsed with small speculum in esophagus.

Name	Age	Object	Location	Time in Situ	Type of Oper.	Result	Complication and Remarks
14. R. D.	4 yrs	Grain of corn	L. B.	8 hrs	High	Cure	Subglottic stenosis for 48 hours of moderate severity. Left chest very tympanitic.
15. F. F.	2 yrs	Peanut kernel	L. B.	3 days	High	Cure	Small larynx, tight tube. Intubated. Severe bronchitis. Extubated in 48 hours.
16. H. N.	1 yr	Green string bean	R. B.	6 hrs	Low	Cure	Tube could not enter main bronchus. Bean about 1 inch beyond end of scope was grasped with forceps.
17. T.	19 mos	Grain of corn	R. B.	2 weeks	High and low	Death	Lung filled with pus. Scope passed through subglottic area with difficulty because of infiltration. Respiration immediately suspended. Low operation; grain of corn easily extracted; flood of pus deluged field. Respiration re-established. Intubation tube introduced; tight fitting; heart immediately stopped. I should have left tracheal wound open and not used the O'Dwyer tube.
18. W. M.	17 mos	Corn bread crumbs	Diffused through bronchi	2 hrs	High	Cure	Respiration very shallow before operation and patient limp; no breath sounds over chest. Quantity of thick, ropy mucus with crumbs of corn bread removed. Free respiration with noisy crying established.
19. A. G.	3½ yrs	Lima bean	Orifice R. B.	48 hrs	High	Death	Skin of bean peeled off easily; bean was softened. Broke away in trachea. Cyanosis and death instantly.
20. M.	5½ yrs	Said to be coffee bean by another physician	R. lung	10 days	High	Cure	Cyanosis and impending death on admission. This was a second-handed case. I removed quantities of mucopus; re-established easy respiration. Pneumonia present. Did not find a foreign body.

Name	Age	Object	Location	Time in Situ	Type of Oper.	Result	Complication and Remarks
21. F. H.	5 yrs	Lead bullet	L. B.	2 weeks	High	Cure	Bullet 32½ mm. circumference difficult to hold in grasp of forceps.
22. H.	2 yrs	Open safety pin, point up	Larynx	2 hrs	High	Cure	Point of pin up; hood just under vocal cords; grasped and wriggled through cords.
23. H.	13 mos	Not known		6 weeks	High and low	Death	No investigation permitted until six weeks after choking spell because only symptom was an occasional hacking cough; tracheal mucosa greatly swollen and tube fitted tightly; respiration ceased when it was introduced. Trachea opened, but tube could not be introduced. Quantities of pus present.
24. N. R.	12 yrs	50-cent piece	Esophagus	3 days	High	Cure	Remarkable tolerance of larynx.
25. J. H.	13 yrs	Cockle burr	Larynx	3 days	High	Cure	Ulcer of abdominal esophagus. Ulcer gave no previous indication of its presence; no subsequent trouble.
26. J. M.	55 yrs	Fresh pork	Pyloric end esophagus	24 hrs	High	Cure	
27. V. R. J.	46 yrs	90 grains beef	Esophagus 4th dorsal	30 hrs	High	Cure	Two previous choking spells. Dilated esophagus above obstruction. Lumen of esophagus narrow and rigid for about 1½ in. 4 yrs. after patient is well.
28. B. R.	6 yrs	Fragment ripe peach	Orifice R. E. B.	48 hrs	High	Cure	Delivered through scope with sucking noise; fitted like a piston.
29. D.	4 yrs	Tin whistle	Esophagus sternal notch	4 days	High	Cure	A previous attempt had been made in another city to remove the whistle with a Killian instrument which overrode it and persistently hid it from view. A Jackson speculum exposed it.
30. E. T.	58 yrs	Gold tooth plate	Esophagus above sternal notch	2 hrs	High	Cure	38 by 21 mm. with three sharp hooks. [illegible]

Name	Age	Object	Location	Time in Situ	Type of Oper.	Result	Complication and Remarks
31. O. L. P.	40 yrs	Beef	Esophagus 9 in. below teeth	3 days	High	Cure	Ulcer at site of obstruction. Emaciated, chronic indigestion before incident. Ulcer treated and healed. General health greatly improved.
32. J.	18 mos	Fragment peanut shell	Trachea	4 hrs	High	Cure	Hand suspension with Jackson speculum. Forceps passed through cords for about 2 in. Shell grasped and extracted without a tube.
33. M. L.	14 mos	Raw peanut kernel	R. B.	3 days	Low	Cure	Intubated 15 hours after bronchoscopy. Raw peanut kernel being very brittle, I feared attempting to pull it through cord and opened trachea; tracheal wound approximated and I decided to intubate when stenosis developed. Intubated 4 times in 2 weeks. Tracheal wound healed by first intention.
34. F. W.	16 yrs	Straight pin	Esophagus behind cricoid	24 hrs	High	Cure	Head down against anterior wall; point imbedded in post wall.
35. D. M.	11 mos	Pine tree bark	Trachea 1½ in. below cord	48 hrs	High	Cure	Hand suspension; extraction without tube.
36. R. S.	3 yrs	Watermelon seed	Lung	4 mos		Recovery	Instrumentation not permitted. Patient coughed out seed 4 mos. after.
37. C. S.	21 yrs	Half peanut shell	R. B.	2 weeks	High	Cure	This shell was rolled into a small rod and was very soft and difficult to dislodge.
38. D.	3 yrs	Safety pin, point up	Larynx	3 weeks	High	Cure	Hood end between vocal cords. First attempt to remove followed by hemorrhage, child vigorously resisting. Under light chloroform anesthesia point thrust through one cord when a fresh hold permitted turning and extraction.
39. J. P.	6 yrs	Watermelon seed	L. B.	5 hrs	High	Cure	
40. C. Y.	3 yrs	Grain of corn	Trachea	3 days	High	Cure	

LXX.

DRUM TENSION AND MIDDLE EAR AIR PRESSURES; THEIR DETERMINATION, SIGNIFICANCE AND EFFECT UPON THE HEARING.

By Edmund Prince Fowler, M. D.,

New York City.

Experimenting with glass models of middle ears, and drum membranes of various strengths, elasticities and tensions, I have demonstrated that plus or minus air pressures therein may be very accurately determined by the use of aneroid barometers connected with the distal side of the drum. Moreover, I have shown that experimental air pressures in the human middle ear may be approximately measured by methods worked out with the models.

One of the simpler procedures is the following:

After the usual inspection I employ a magnifying pneumatic speculum having from its tube leading to the examiner's mouth an offset connected to an aneroid monometer (the ordinary sphygmomonometer serves well).

The examiner, focusing his eye particularly upon the posterior superior quadrant of the drum (this being usually the most movable), very gently alternately compresses and rarefies the meatal air by blowing and sucking through the mouth tube, gradually increasing these efforts until he is just able to detect a movement of the drum. The amount of plus or minus pressure required to make this movement visible, being approximately equal to the pressure behind the drum, is noted as registered upon the dial of the aneroid. (Plus pressures vary up to one and one-half times the pressure we are measuring in the middle ear.) With practice the manometer may be dispensed with for qualitative work, as one soon learns to interpret, with sufficient accuracy for clinical purposes, the amount of effort required to produce up to 1 or 2 mms. pressure (plus or minus). Pinching and releasing the open mouth tube between the teeth creates 1 to 2 mm. plus and minus pressure, etc.

Unless adhesions leave no portion of the drum membrane movable, the method given you will detect pressure variations satisfactorily. Forcible efforts may locate adhesions but are misleading when used for determining pressures. To avoid false impressions, especially with relaxed drums or centered drums, it is important to employ both suction and compression through the speculum.

I call a drum centered when it is in the plane of its peripheral attachment, as modified by the malleus or adhesions—i. e., the air pressures are equal upon its two sides.

Although a report in detail cannot be submitted until a later day, at this time it is proper to note a few of the results obtained through the use of the method, these having a direct bearing upon the subject under discussion:

1. Negative pressures have ranged from nil to 20 mm. Hg. (never more than 20 mm. negative pressure).

2. Positive pressures have been largely experimental; 250 mm. are borne per tubam by many persons without pain or apparent damage to the ear. After politzerization from nil to over 20 mm. Hg. have been measured. By Valsalva's method the greatest pressure I can maintain is about 100 mm. Hg. Politzer states that the drum will withstand from 3 to 4 atmospheres without rupture (45 to 60 pounds to the square inch area of drum).

3. In a large proportion of the cases examined, no abnormal pressures were demonstrable, although from the usual interpretation of the otoscopic and inflation findings ample evidence of such presented.

4. Contrariwise, in tubes showing patency to even gentle inflations, I have observed vacuums in the middle ear of from 10 to 15 mm. Hg. This demonstrates the inaccuracy of our present methods for diagnosing tubal closures, and again calls attention to the valvelike action from slight negative pressures in the middle ear, and the necessity of restoring tubal function rather than tubal penetrability to inflation.[1]

5. Exceptionally I have examined tubes apparently impervious to air by all the usual methods of inflation, and yet there were vacuæ in these middle ears. The significance of these findings appears to be:

1. Negative pressures have not exceeded 20 mm. Hg., because at about this figure there will occur an obliteration of the tympanic cavity by serum transudate or sucking together of the walls. In experimental pressures the collapse of the tubal walls prevents further vacuæ than 20 mm.

2. That almost unbelievable amounts of plus pressures are bearable without pain is corroborated by clinical experience with acute abscesses, such often giving no distress, though the exudate pressure is high. (Bulging of the drum is not the cause of pain per se.)

3. The otoscopic picture heretofore accepted as meaning middle ear vacuum is in reality often a sign of past pressures, the malleus and drum remaining in the retracted position from tensor tympani shortening, adhesive processes or simple redundancies.

4. Especially because of the habit of forcibly sniffing air through the nose or violent attempts at clearing the nasopharynx of mucus, a negative pressure is easily established within the middle ear, due to the collapse of the tubal walls and subsequent air absorption increasing this closure. A slight tugescence or narrowing of the tube from any cause will in such cases interfere with the physiologic reestablishment of the normal air balance. Even gentle inflations may, however, suffice to reventilate these ears, unless continued repetition finally diminishes the resiliency of the tubes.

5. Except to remark that we have much to learn, I will at this time attempt no comments upon the seeming paradox of stenosed tubes and no accompanying middle ear vacuums.

The effect upon the hearing of middle ear air pressures is shown in the following tables.

I grant that the experiments are complicated by the unavoidable effects upon the inner ear, through pressures upon the peri and endolymph, but it appears reasonable to infer that either equal plus or negative pressures upon the drum, ossicles, oval and round windows, and labyrinth contents, must about equally immobilize the same, and thus equally increase bone conduction and offset to this extent the loss in hearing brought about by labyrinth end organ inhibition. Also as the tubes are wide open during Valsalva's method of inflation, the sound of vertex forks will be augmented, as I have elsewhere shown.[2] The effect upon the oval window of autodeflation is lessened by the opposed actions of the drum and the vacuum created in the middle ear.

These facts are brought forward to support the claim that the experiments show, it may be only roughly, the loss of hearing caused by drum hypertension. Condensation and rarefaction of meatal air bring out more forcibly the effects upon the endolymph, by stapes and round window movement, and for that reason were not employed in these tests.

To simplify the data I have reduced all results to percentages of reduction or of duration of sound.

A positive air pressure of 20 mm. Hg. within the middle ear, instituted and maintained by the Politzer bag or by Valsalva's method of inflation, diminishes the perception of tuning forks on an average as follows:

	C	Dur.	C1	Dur.	C2	Dur.	C3	Dur.	C4	Dur.
A. C...........	50%	25/50	43%	17/30	33⅓%	40/60	27%	22/30	5%	19/20
B. C...........	4%	24/25	14%	13/15	16 %	28/33	20%	12/15	10%	9/10

A negative air pressure, estimated to be 20 mm. Hg., was attempted, as this was the highest negative pressure observed in disease, and the highest I could maintain in my own ears. Seeming irregularities in the data are probably due to my inability to hold the pressure with certainty. The perception was diminished as follows:

	C	Dur.	C1	Dur.	C2	Dur.	C3	Dur.	C4	Dur.
A. C...........	46%	27/50	36%	19/30	33⅓%	40/60	17%	25/30	5%	19/20
B. C...........	8%	23/25	15%	13/15	18 %	27/33	20%	12/15	10%	9/10

Note that 20 mm. Hg. pressure lowers the hearing time to about the same degree, irrespective of whether it is plus or minus: a trifle less for the two lower forks by A. C. with plus pressures, a trifle more for the three lower forks by B. C. with minus pressures.

To eliminate largely the factor of bone conduction fluctuations, both ears were closed by perforated plugs. This increases the normal B. C. from 5 seconds for C^2 down to nil for C^4, as shown in the tables. Twenty mm. plus pressure by Valsalva shows duration of hearing is diminished:

Twenty mm. plus pressure by double autoinflation through the nose and meatal plugs as follows:

C	Dur.	C1	Dur.	C2	Dur.	C3	Dur.	C4	Dur.
20.0%	24/30	42.4%	10/17½	34.2%	25/38	25.0%	12/16	00.0%	10/10
6.6%	28/30	31.4%	12/17½	23.8%	29/38	12.5%	14/16	0.0%	10/10
Difference—									
13.4%	4/30	11.0%	2/17½	10.4%	4/38	12.5%	2/16	00.0%	0.00

The percentage of difference represents, roughly, the effect of drum tension upon craniotympanic conduction, as in the first experiment the drum was markedly tensified, and in the second drum movement was avoided by the positive pressures being made equal upon its two sides. Otherwise the experiments were identical.

Drum tension then gave us a reduction in hearing of, say, 10½ to 13½ per cent, except for the highest fork, for which no change between the two conditions could be sensed. As this fork shows little or no effect from pressures of any sort, such a result was to be expected.

The differences between the data last obtained, from the data in the first table, may be in part accounted for by the elevation of the standards for bone conduction. This removes two factors which in the first table were operating, namely:

1st. The increase in bone conduction time when pressure loads the middle ear mechanism.

2. The lower standard which in itself prevents a proportionately equal fall in hearing.

In bone conduction experiments, one cannot obliterate all air conduction (craniotympanic), and this difficulty mounts higher with the higher forks. I have, however, eliminated to a great extent the differences in bone conduction, and when this was done it appeared as though but little loss of hearing occurred by tensification of the drum, but that the more important inhibitors of audition were the obstructions to sound transmitted, set up by the tensification and loading of the whole apparatus, and the inhibition to sound perception by pressure changes upon the endolymph and labyrinthine end organs.

Rinné was never negative, in spite of the concomitant limitation by immobilization of the vibratility of the whole conducting mechanism. I have been unable to create a negative Rinné by the ordinary plus or minus pressures within the middle ear. These observations lead me to believe that drum hypertension cannot cause it. Though hearing be markedly lessened by obstructive processes, inflations per tubam may increase audition, with the drum hypotense or not, thus again indicating that more important than drum tension is mobilization of the conducting mechanism. This is suggested also by the fact that many people with relaxed, weak or retracted drums hear exceptionally well (a whisper at more than twenty feet).

A study of the tables will suggest many fascinating lines of thought, but before even suggesting any such, I must very carefully and repeatedly check up the data, for it is more difficult than it appears at first thought to put down results in figures which one may state are final.

CONCLUSIONS.

1. Middle ear air pressures and resultant drum tensions may be accurately diagnosed and estimated by the method I have described.

2. Almost unbelievable amounts of positive pressure are borne without pain.

3. Inspection and inflations are often misleading as to the present state of the air pressure in the middle ear.

4. The position of the drum and attachments alone cannot inform us of the presence of negative air pressure behind them or of the amount of tension loss. The otoscopic picture heretofore accepted as meaning middle ear vacuum is in reality more a sign of past negative pressures.

5. The eustachian tube need not be demonstrably patent to inflations in order to maintain an approximately normal air balance within the tympanic cavity.

6. Slightly blocked tubes may cause marked vacuums and yet be easily inflatable. The primary requisite for all cases of abnormal drum tension is the maintenance of tubal function.

7. The experiments detailed show the effects of drum tension upon craniotympanic conduction.

8. A negative Rinné indicates more than hypertension of the drum.

9. The relative importance of drum tension per se has been overestimated. Of equal or more importance is the vibratility of the conducting mechanism of the middle ear.

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616 Madison Ave., June 1, 1920.

LXXI.

THE MORTALITY FROM MASTOIDITIS IN THE U. S. A. BASE HOSPITAL AT CAMP PIKE, ARK.

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During the past year several articles have appeared in the medical literature concerning the many cases of mastoiditis seen in the various army hospitals in the United States. There has been frequent comment also, and sometimes adverse comment, regarding the large number of mastoidectomies performed in the army hospitals situated in the southern part of the United States.

The Base Hospital at Camp Pike, Ark., was opened for the reception of patients on September 27, 1917, and closed about July 1, 1919. During this period 269 patients were operated upon for mastoiditis out of a total of 55,532 admissions into the hospital, the proportion being, therefore, one mastoid patient out of about 205 admissions. This is admittedly a large number of mastoid operations, a fact which was fully appreciated by the personnel of the otolaryngologic service and by the various medical officers who acted as chiefs of the surgical service. Many methods of treatment were followed, but the mortality remained almost constantly the same. One otologist of splendid training and adequate experience became pessimistic as to the benefits of the mastoid operation and attempted to treat practically all the cases of streptococcic otitis by free paracentesis and the application of various medicaments to the external auditory canal. Some patients on whom the diagnosis of mastoiditis was certain apparently recovered and were discharged from the hospital, but so far as the writer is aware all these patients suffered a recurrence of the disease and were operated upon later. However, the most noticeable result of this conservative method of treatment was an immediate and alarming increase in the cases of lateral sinus thrombosis, five cases developing this complication within a few weeks.

After the various departments of the Base Hospital became thoroughly organized it was a practice to request an autopsy upon every patient dying in the otolaryngologic wards. At these autopsies, especially during the last year of the hospital's operation, the pathologist in every case endeavored to find the nature of the complication causing death and the point at which the infection reached the meninges. It is believed, therefore, that a detailed study of these cases will be of special interest, particularly as so many patients, seven at least, lost their lives from osteomyelitis of the apex of the pars petrosa, a complication which develops independently of the disease in the mastoid process and which is beyond the scope of mastoid surgery.

Out of the 269 cases operated upon there were 28 deaths from all causes, giving a mortality rate of 10.4 per cent. In cases operated upon one side, the percentage was 9.1, while patients with bilateral mastoiditis, of which there were 28, showed a mortality of 21.4 per cent.

It was the impression of the otolaryngologic personnel that the infections of the mastoid process increased in severity as time went on and the infecting organisms increased in virulence. This opinion is not borne out in the statistics, as the death rate was about 10 per cent for the entire period, with eleven deaths among the first one hundred patients operated upon and seven out of the last sixty-nine. It is possible and indeed probable that improvement in methods of operation may have lowered what would otherwise have been a much higher mortality during the last year of the operation of the Base Hospital, but this must be left to conjecture.

Etiology.—In by far the great majority of cases the streptococcus hemolyticus was found to be the causative organism. Eight of the fatal cases were admitted with a primary otitis media, eight for measles, three for tonsillitis, three for coryza, two for influenza, two for bronchitis, one for lobar pneumonia and one for mumps (?).

The epidemic of influenza played little part in the incidence of infections of the middle ear. Most of the patients suffering from this disease were admitted between July 15th and October 15th. During this period there were 17,679 admissions into the hospital, only nine of which were operated upon for mastoiditis. The mortality, however, was high, five of these patients succumbing to the infection. This high death rate was due probably to a succession of extremely unfavorable cases. All were operated upon by surgeons of extensive experience, and among them were included two patients with brain abscess, one with sinus thrombosis and one with an infection of the petrous process.

Sex.—Only two females were operated upon for mastoiditis out of a total of 474 nurses who were on duty at the Base Hospital up to April 1, 1919. One of these died from an infection of the petrous portion after an apparent recovery from a cerebral abscess of the right side.

Race.—All the fatalities were among the white patients. Eleven negroes were operated upon but none died.

Length of Service.—This varied from two weeks to eleven months. On an average the patients were admitted from the second to the fourth month of army service.

Time of Operation.—The time intervening between the onset of otitis media and the mastoid operation varied from three to thirty-five days. These figures are fairly representative for all the cases operated upon, and the writer does not believe that the results obtained at Camp Pike indicate the advisability of the extremely early operative interference as a routine practice.

Time of Death.—Necrosis of the squamous bone into the middle fossa caused death in from eight days to eleven weeks; erosions into the posterior fossa were fatal from the fifth to the ninth week; lateral sinus thrombosis with meningitis caused death in from five to nine weeks; one case dying of pyemic abscess and empyema after complete closure of the mastoid wound did not succumb until the seventeenth week. Necrosis of the tegmen tympani resulted in death twelve days after the diagnosis of otitis media and twenty days after the onset of measles. Infection of the pars petrosa was fatal in from six to thirty-five weeks.

LESIONS CAUSING DEATH.

Lobar Pneumonia.—Two patients died from this complication, one death occurring three days and the other six weeks after operation.

Intracranial complications were the cause of twenty-six fatalities, all of which were due to a terminal meningitis except the one patient mentioned above, who succumbed to empyema and pyemic abscess after many weeks of illness. The practical application of these facts would seem to be that after the operation for streptococcic mastoiditis the death of a patient without pyemic symptoms and with normal cerebrospinal fluid must be ascribed to another cause than an intracranial complication. In the following table the fatal cases are arranged in groups according to the paths by which infection reached the meninges from the middle ear, mastoid process or eustachian tube. This classification seems a better one than that usually found in works on otology because, in the first place, practically all these patients died from a meningitis; again, the cerebral abscess when found is usually a mere incident in the course of a meningitis, and finally the clinical pathology of the disease is better understood when studied in this manner. It is also worthy of note that no case of extradural abscess occurred in our wards.

In smears of pus from the middle ear, the mastoid or the cerebrospinal fluid the streptococcus is commonly found as a Gram positive diplococcus. Cultures taken from the same source show a growth of streptococcus in typical chain formation. Many of the earlier cases of mastoiditis at Camp Pike were reported as due to the pneumococcus, whereas the streptococcus was the causative organism. The writer was present at the last twelve autopsies performed, and in all the streptococcus hemolyticus was found on culture. It is also worthy of note that the streptococcus nonhemolyticus was frequently found in the middle ear and the streptococcus hemolyticus in the antrum or mastoid cells.

Case No.	Mos. of Service	Etiology	Day Opera'd	Onset Fatal Comp.	Week of Death
Osteomyelitis of Pars Petrosa.					
(a) Perforation Under Gasserian Ganglion.					
170	....	Primary Otitis........	4th	?	23rd
172	1	Influenza	8th	?	35th
174	3	Primary Otitis........	9th	?	13th
206	4	Measles	12th	?	8th
Perforation in Anterior Surface of Petrosa.					
15	1	Measles	26th	?	9th
209	2	Measles	15th	?	17th
257	6	Tonsillitis	14th	?	7th
Necrosis Through Inner Table of Pars Squamosa Into Middle Fossa.					
126	5	Coryza	21st	5th wk.	7th
138	4	Primary Otitis........	13th	2nd wk.	3rd
169	1	Measles	12th	-7th wk.	11th
191	1	Measles	3rd	1st wk.	2nd
214	4	Primary Otitis........	24th	-4th wk.	4th
Erosions Into Posterior Fossa.					
51	3	Tonsillitis	5th	7th wk.	9th
84	1	Lobar Pneumonia..	14th	5th wk.	7th
94	5	Primary Otitis........	4th	5th wk.	5th
Erosion Through Tegmen Tympani					
49	4	Measles	2nd	2nd wk.	2nd
Lateral Sinus Thrombosis.					
179	1	Influenza	19th	3rd wk.	17th
204	4	Primary Otitis........	15th	4th wk.	6th
246	11	Primary Otitis........	4th	6th wk.	8th
262	9	Bronchitis	32nd	6th wk.	7th
Leptomeningitis—Path of Infection Not Found.					
8	1	Coryza	18th	12th wk.	13th
9	6	Tonsillitis	24th	9th wk.	9th
37	2	Coryza	25th	9th wk.	10th
38	?	Bronchitis	16th	3rd wk.	4th
102	4	Primary Otitis........	35th	7th wk.	8th
138	4	Primary Otitis........	33rd	-5th wk.	5th
167	1	Measles	2nd	1st wk.	1st
Lobar Pneumonia.					
6	4	Measles	2nd	7th wk.	9th
96	4	Primary Otitis........	16th	3rd wk.	3rd

Remarks.—Among the patients dying with osteomyelitis of the petrosa, none was found to have developed brain abscess from perforation under the Gasserian ganglion. However, one patient (172) presented definite symptoms of a brain abscess with an apparent recovery from this complication. The abscess, however, was not situated at the base of the skull but was situated in the Rolandic area because there was a facial paralysis of the opposite side. In one instance (170) an attempt had been made to close the posterior wound by plastic operation without beneficial result. Case 174 was operated upon for pneumococcic mastoiditis of the right side, became infected with streptococcus in the ward and developed mastoiditis of the left side and lateral sinus thrombosis. He was operated upon for these affections, and all the wounds healed kindly, but the patient died from the infection of the petrous bone and meningitis. Case 206 was operated upon for a right mastoiditis and later refused operation on the left mastoid with fatal results.

When the perforation is in the anterior surface of the petrosa there is apt to be a brain abscess. In cases 15 and 209 both had this type of perforation and both had brain abscesses in relation to the perforations. Case 15 showed a similar perforation on the opposite side without formation of a brain abscess. In case 257 there was a sudden rupture of a large quantity of pus from the excavated petrous bone and the patient died quickly from meningitis.

Necroses through the squamous into the middle fossa resulted in brain abscess in all the five cases tabulated, with the exception of case 138, in which autopsy demonstrated the presence of hemorrhagic external pachymeningitis of some weeks' standing, with partial organization. In case 169 there was an infection of a group of zygomatic cells anterior to the auricle, with perforation and the formation of brain abscess with typical symptoms; the abscess was drained but meningitis developed immediately.

Only one case (94) of cerebellar abscess was among the three patients who died from erosions into the posterior fossa. However, the other two patients had choked discs and other signs indicative of increased intracranial pressure, and it is possible that at autopsy on these patients cerebellar abscesses were overlooked. In case 84 the perforation was in the depth of the wound lateral to the antrum, and in case 51 the necrotic area was posterior to the lateral sinus.

Two patients died of lateral sinus thrombosis after ligation or excision of jugular and obliteration of the sinus. Case 204 died of meningitis and case 179 succumbed to empyema and septic abscess, as mentioned above, after complete healing of the operative wounds. Cases 246 and 262 had sinus thrombosis with completely occluding thrombus and developed meningitis from perforations about one inch external to the torcular Herophili, one perforation opening into the posterior fossa (246) and the other into the middle fossa (262). Case 49 developed meningitis from a perforation of the tegmen tympani.

Among the seven cases who died of meningitis and in which the path of infection was not found, the histories show that three (9, 38, 102) had symptoms pointing to lateral sinus thrombosis, such as chills, high fever and arthritis.

CONCLUSIONS.

From a study of the fatal cases of mastoiditis occurring at the Base Hospital at Camp Pike, Ark., the following conclusions seem justified.

1. The microorganism responsible for most cases of mastoiditis was the streptococcus hemolyticus.

2. Deaths due to otitic complications were attributable for the most part to osteomyelitis of the pars petrosa, erosions into the middle fossa, lateral sinus thrombosis, erosions into the posterior fossa and necrosis of the tegmen tympani, the comparative frequency of these routes of infection being in the order named.

3. The streptococcus hemolyticus attacked by preference the cancellous tissue of the bony structure, resulting in a true osteomyelitis and not in a mere empyema of the mastoid cells. Access to the meninges and the lateral sinus was effected by the perforation of thin plates of bone. The dense bony capsule of the labyrinth was entirely resistent to the streptococcus hemolyticus. The tegmen tympani also seeemd to enjoy an immunity, which was probably due to the performance of early and repeated paracenteses.

4. Erosions into the middle and posterior fossæ and perforations of the anterior surface of the petrosa were commonly associated with brain abscess, which was often without symptoms and a mere incident in the course of meningitis.

5. Extra dural abscesses were not associated with infection by the streptococcus hemolyticus.

6. The mortality rate for bilateral mastoiditis was more than twice that for mastoiditis of one side.

7. Infection of the pars petrosa develops independently of the disease in the mastoid process and is beyond the scope of a mastoid operation. The mortality from this single complication was approximately 2½ per cent.

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

Intracranial Lesions Involving the Auditory-Vestibular Apparatus.

Carpenter, E. R.

J. Am. M. Ass., Chicago, 1920—LXXIV—469-471.

Intracranial lesions involving the auditory-vestibular apparatus may be considered to advantage under three heads: (1) lesions primarily involving the cerebellar fossa; (2) lesions primarily involving the brain steam and midbrain, and (3) lesions primarily involving the cerebral cortex and subcortex region.

1. Lesions in the region of the cerebellum are of special importance to the otologist, as they include many conditions that are amenable to improvement or cure if they are diagnosed early and properly treated. The lesions most likely to be encountered here are acute inflammatory diseases involving the meninges, acute and chronic abscesses, tumors of the meninges and of the nerve trunks, syphilis in its various forms, traumatism, circulatory diseases, tuberculosis and multiple sclerosis. Eighty per cent of the abscesses in the posterior fossa originate from infected ears; consequently, the diagnosis and treatment of this condition falls primarily to the otologist, who must be familiar with the differential prognosis of lesions in this region and with the various operative procedures required for relief. In all major otologic operations, repeated vestibular tests should be made, as they often indicate intracranial trouble long before clinical symptoms develop.

2. Any of the diseases already considered may also involve the auditory-vestibular apparatus in the brain stem; but the symptomatology in brain stem lesions varies considerably from that encountered in the cerebellar region. Certain additional diseases peculiar to the nervous system are encountered in the medulla, pons and midbrain region, such as tabes, syringomyelia and polioencephalitis. However, the preponderance of brain stem lesions are included under syphilis, tuberculosis, circulatory trouble and toxemia.

3. Cortical and subcortical disturbances of the auditory-vestibular apparatus have not been investigated thoroughly. However, the tracts of the auditory fibers are well known, and the auditory centers are known to be located in the first temporal convolution on each side of the cerebrum, and lesions in that region may produce disturbance in hearing, especially if bilaterally located. No doubt some cases of deafness originate from this source which are presumed to be of labyrinth origin, as microscopic study of the pyramidal cells in the first temporal convolution reveals intercellular changes similar to those found in the motor and sensory

pyramidal cells, in certain diseases. Possibly in exceptional cases the auditory disturbance in tabes, polioencephalitis, paresis, toxemia, and especially in some of the infectious diseases, are from this source.
Emil Mayer.

Anomalous Sigmoid Sinus Thrombosis With Report of Cases.

Barnhill, John F.

Med. Rec., N. Y., 1920—XCVIII—388.

Many case reports show atypical sinus thrombosis in that there is an almost complete absence of ear symptoms. The rather common belief that there must be present a discharging ear, mastoid tenderness and great pain should be revised. Especially should emphasis be given to the fact that swelling and tenderness of the neck along the course of the internal jugular vein are rarely present, and only in the late and fatal cases. In my own experience of 37 cases of sinus thrombosis, mastoid tenderness has been absent in nearly 50 per cent, and in one only, a case that was septic generally, partially unconscious and near death, was there swelling of the neck along the vein. In only five of my cases have there been actual chills. Chilly sensations have usually been present, but this fact is ascertained only by carefully watching the patient, and by frequently quizzing the attendants concerning the point. Strabismus and other eye symptoms have likewise been rare. Only 16 of my patients were examined for optic neuritis, and but two of these had choked disc, a rather low percentage, since Crockett reports that 25 per cent of his cases had choked disc, while Jansen states 28 per cent, and Johnson records two-thirds of all cases.

Occasionally a case is met with in which the aural discharge is absent, or apparently absent, and no history of former discharge can be obtained. Numerous cases of this class are reported. There is another type of case in which there either has been no discharge at all, or in which the discharge has been trivial and has continued only a few hours or days.

The cases here reported had each an acute and trivial otitis which lasted but a few hours or days, was then either forgotten or disregarded, and was later not connected with the serious illness which followed.
Emil Mayer.

A Case of Cerebellar Abscess Diagnosed Postmortem.

Lobell, Abraham.

J. Am. M. Ass., Chicago, 1920—LXXV—601.

This case is a concrete example of the serious complications to which the human organism is subjected in the presence of a chronic focal infection. In this man, it was the cause of a cerebellar abscess and very likely the osteomyelitis of the foot.

Did this man walk around with a socalled latent abscess, lying dormant for many years and only aroused to mischief by an intercurrent secondary pneumococcus infection? That this is not uncommon in spite of the absence of definite symptoms, has been established by numerous observers. To explain how this takes place it is necessary to recall the cardinal symptoms and signs of a cerebellar abscess, namely, headache, mostly occipital, persistent vomiting, dizziness, vertigo, staggering gait, etc. These are the very signs and symptoms of a labyrinthitis, a condition invariably associated with cerebellar abscess in those instances in which the infection travels by contiguity through the labyrinth from the mastoid to the cerebellum. However, in those cases in which the infection travels through the small veins from a necrotic area in the cells of the mastoid, the destruction of the cerebellar tissue is a slow and gradual process, and the labyrinth remains intact, capable of taking up the function of the cerebellum. It is for this reason that in this variety there are no signs and symptoms, and the Barany test is also negative. In addition to the labyrinth, the destruction of cerebellar tissue is also compensated by the cerebrum, the vestibular nuclei and the sensory tracts.

We may inquire into the immediate cause of the death in this case, but a true explanation is only problematic. In other reported cases of similar outcome, it was thought to have been caused by the pressure of the abscess on the medulla, as a result of an increasing edema from ether congestion of the brain. It is for this reason that some authorities advice judicious and careful administration of chloroform in preference to ether in diagnosed cases of cerebellar abscess, believing that it produces no congestion in the brain. Another important factor must be considered in the causation of immediate death, and that is the performance of a lumbar puncture while the patient was still on the operating table, about twenty minutes before he died. Although only 10 cc. of cerebrospinal fluid was withdrawn, under apparently high pressure, nevertheless it must have influenced the pressure of the abscess on the vital centers in the medulla, especially in the seat of respiration. This is in accord with the established dangers of performing lumbar punctures in cerebellar tumors or abscesses. It may be of interest to recall that the most deceptive element in the course of this man's illness was the fact that he improved and was well for a while. This interval of well being usually diverts our attention from the suspicion that we are dealing with a serious disease. This interval has occurred in many cases that are recorded, and some observers have come to look on this as a characteristic feature of the course of the disease. Emil Mayer.

II.—NOSE.

Frequent Causes and the Treatment of Perennial Hay Fever.

Walker, Chandler.

J. Am. M. Ass., Chicago, 1920—LXXV—788.

Perennial hay fever is frequently caused by animal emanations, and cutaneous tests should be made with the common animal epidermal proteins.

Those patients whose hay fever is caused by exposure to horses may be successfully treated by repeated inoculation in gradually increasing amounts of the particular epidermal protein to which they are most sensitive.

Those patients who are sensitive to cat hair protein may be treated similarly with equal success. Dispensing with the cat, however, is easier of accomplishment and is usually beneficial.

With those who are sensitive to the epidermal proteins of other animals (pets) it is preferable to avoid that particular animal. Sensitization to feather protein from feather pillows is frequent, and the substitution of floss pillows is desirable.

Perennial hay fever is frequently caused by the ingestion of foods and by the inhalation of the cereal grain flours. Cutaneous tests often reveal such a cause, and omission of the protein is the desirable mode of treatment.

Patients who have seasoned pollen hay fever frequently have paroxysmal symptoms throughout the year. Satisfactory preseason treatment with the particular pollen that causes the seasonal hay fever frequently relieves the perennial symptoms.

Recurring head colds are frequently coincident with the foregoing sensitizations, and relief from these head colds usually follows proper treatment, as already outlined. This type of head cold is probably not due to an infection but rather a result of sensitization which renders the nasal mucous membrane easily irritable.

Nonsensitive patients with perennial hay fever or vasomotor rhinitis, provided there are no demonstrable abnormalities, growths and the like in the nasal cavities or sinuses, are sometimes benefited or relieved by autogenous vaccines made from the nasal secretion. The same statement also holds true for those patients who are subject to frequent head colds.

Olfactory vasomotor rhinitis, or pseudo hay fever, caused by mechanical, thermal, chemical and odorific irritants, is not uncommon and should be recognized.

The ingestion of foods may cause symptoms referable to the eyes alone. Therefore, although protein sensitization should not be considered as a "cure all" or a cause of all obscure conditions, the cutaneous test for protein sensitization deserves a place among diagnostic tests, and when properly performed and interpreted, it is a very useful test. Emil Mayer.

A New Operation for the Relief of Dacryocystitis Through the Nasal Route.

Wiener, Meyer, and Sauer, William E.
J. Am. M. Ass., Chicago, 1920—LXXV—871.

A Ziegler probe is introduced through the inferior canaliculus into the lacrimal sac. The probe is then directed downward until it reaches the bottom of the sac, when it is turned inward at an angle of 45 degrees and then forced through the external nasal wall into the nasal cavity. In some cases a punctum dilator must be used before the Ziegler probe can be introduced. In a few cases we were unable to introduce the probe through the lower canaliculus, but had no difficulty in going through the upper one. In none of the cases did we find it necessary to slit the punctum.

The probe enters the nasal cavity just in front of the anterior end of the middle turbinate. In some cases in which the middle turbinate is large, a portion of the anterior end must be removed immediately preceding the introduction of the probe. In cases in which the nose is narrowed by a septal deviation, a submucous resection must precede this operation, but in the majority of cases this is not necessary.

The next step is to withdraw the probe partially, having enough of the point visible in the nose to serve as a guide for the removal of as much of the bony covering of the canal and lacrimal sac as is necessary to establish a permanent opening. The opening made by the probe may be enlarged with a small punch forceps or chisel. In some of the cases we have been able to enlarge the opening by introducing a Hajek hook and turning the point upward, and with a little pressure medially fracturing the nasal wall of the sac and then removing the fractured bone with small biting forceps. In some cases a chisel curved on the flat has been used when the bone is unusually thick. The bony opening is extended upward so that the probe may be introduced into the nose almost at right angles. That is, the handle of the probe, instead of being almost vertical as when pushed into the nose, may be introduced in a horizontal position. It will now be found that a portion of the sac may be pushed through the bony opening into the nasal cavity; with the sac held in this position, biting forceps are introduced into the nose, and as much of the sac as possible is grasped between the jaws and held there until the probe is removed, and then the jaws of the forceps are closed, biting out a portion of the sac.

The bleeding usually is very slight; in no case has packing been required. The patient is not disturbed until the third day, when a No. 4 Bowman probe is introduced into the nose. This is repeated every third day or oftener, depending on the tendency of the opening to close. Granulations are kept down by means of a 40 per cent solution of silver nitrate until the wound in the nose is entirely healed. The introduction of the probe and the applications of the silver solution are the chief points in the success of the operation. If these cases are not carefully watched after the operation, the opening quickly closes. Emil Mayer.

Closure of Fistulous Openings Through Alveolar Process Into Antrum of Highmore.

Welty, Cullen F.

J. Am. M. Ass., Chicago, 1920—LXXV—867.

Under general anesthesia, an incision was made at each end of the fistula on the outer side of the alveoli, and carried well up to where the bone had been removed in the antrum of Highmore operation. Periosteum and mucous membrane were removed from the alveolus, and afterward the whole of the outer border of the alveolus, into the antrum of Highmore. A similar incision was made on the inside at each end the fistula, periosteum and mucous membrane elevated from the bone, and the bone removed. By this time we had an opening an inch and a half long, into which the finger could enter the antrum of Highmore.

An incision was now made in the median line of the hard palate its entire length, and the periosteum elevated over the entire area. It is easy to understand that by this procedure all tension will be removed when sutures are introduced. That the sutures may not cut the tissue, two perforated lead disks are used on each side and the sutures tied rather snugly. This can remain for ten days, when it wil be found that the union has been complete.

There are many persons about the country suffering from a fistulous communication with the antrum of Highmore who can be readily cared for in the way described. Emil Mayer.

Inoculation Against Hay Fever.

Walter, Will.

J. Am. M. Ass., Chicago, 1920—LXXV—671.

We give no more large doses at season and am withholding all preseason inoculation with ragweed pollen protein.

It being a well established principle that anaphylatoxic poisoning is best met by increasing blood alkalinity and by administration of minute doses of homologous protein, we adopted an alkalin dietary and regimen, and the frequent use of fractional doses of pollen protein hypodermically in all cases at season.

The results so far have been universally encouraging.

Emil Mayer.

III.—PHARYNX AND MOUTH.

The Tonsil in Relation to Infectious Processes.

Davis, John David.

J. Am. M. Ass., Chicago, 1920—LXXIV—317.

In order to understand clearly the genesis of certain diseases it is necessary to study intensively a suspected focus of infection, like the tonsil, in both normal and infected persons.

Lymphoid structures attain two maxima of distribution: one in the throat and another in the region of the ileocecal valve and appendix; these maxima correspond in general to the normal distribution of bacteria in the alimentary canal. At these points also the greatest number of pathogenic microorganisms attack the body. Plasma cells appear shortly after birth (therefore after infection) under the mucosa, and their presence probably indicates chronic absorption of infectious and other material.

Certain organisms injected into the crypts of the tonsils disappear in a few days. The flora normally found in the tonsils is a restricted one.

Actinomyceslike granules, composed of fusiform bacilli, streptococci and spirochetes growing together, appear as more or less normal inhabitants of the crypts. Here may be an important source of bacillus fusiformis in certain infections about the mouth caused by this organism.

In the tonsil crypts streptococcus hemolyticus is almost constantly found. This focus is one source of these organisms in the throat and adjacent structures. This fact may be considered in making throat cultures and in a study of the problem of hemolytic streptococcus carriers. Emil Mayer.

Hemolytic Streptococci in the Normal Throat After Tonsillectomy.

Van Dyke, H. B.

J. Am. M. Ass., Chicago, 1920—LXXIV—449.

In the series of tonsillectomized throats of individuals in good health it was found that in nine, or 16.4 per cent, there were markedly hemolytic streptococci resembling Brown's Alpha prime throats, were the less markedly streptococci resembling Brown's Alpha prime type. Thirty, or about 55 per cent, of the throats examined revealed no hemolytic streptococci. There seemed to be no significance in the time elapsing between the removal of the tonsils and the bacteriologic examination of the throat for hemolytic streptococci. In several of the cases the Beta type of hemolytic streptococci was present, in the absence of clinically visible changes in the throats. The fermentation reactions of these streptococci were typical of hemolytic streptococci. According to the classification of hemolytic streptococci by fermentation reactions as suggested by Holman, the organisms tested would be divided into two groups, streptococcus anginosus (fermenting lactose but not mannite and salicin) and streptococcus pyogenes (fermenting lactose and salicin but not mannite).

The method employed in this work differs from the work of most investigators in that a routine preliminary cultivation of the throat cultures in blood broth was made. While some reports mention streptococci whose hemolytic action is incomplete (Alpha prime type), none give very definite data on the proportion of such organisms. The Beta type of hemolytic streptococcus is probably the type referred to by most authors as hemolytic. Hence the findings, namely, that 16.4 per cent of the tonsillectomized throats harbored markedly hemolytic streptococci, while higher than those of Tongs and lower than those of Simmons and Taylor agree quite closely with the observations of Nichols and Bryan, and Pilot and Davis. Emil Mayer.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Fibrotuberculoma of the Larynx.

Portmann, George.

Presse méd., Paris, 1920—XXVIII—101.

Tuberculosis does not only produce limited neoplastic manifestations but also the large laryngeal tumor which in growing invades little by little the vocal organs and the surrounding tissues.

It is this type of tumor, peculiar as to histopathologic structure, which shows clinical manifestations which are so alike that they may be mistaken for those of a neoplasm, which the writer describes fibrotuberculoma of the larynx.

He makes a complete clinical, anatomopathologic table.

The functional symptoms are those of all laryngeal tumors, disphony and hoarseness at the beginning, then raucity and aphony when the tumor has increased in size and respiratory troubles and attacks of suffocation appear.

An important sign is that the fibrotuberculoma never produces real pain. Objectively a localized tumor is observed in the different stages of the affection, the seat of which is variable, but well marked at first and which little by little spreads to the adjoining tissues.

Within the larynx it spreads beyond the organ and progresses towards the exterior.

The fibrotuberculoma, the evolution of which is nearly always very slow, is composed of the fibrous tissue, in which typical tubercular "follicules" are found, either alone or agglomerated.

Its diagnosis being difficult in the beginning with mild tumors, the syphilitic gum and especially with advanced cancer, can only be ascertained with certainty after a biopsis and a histologic examination.

The tumor, though not dangerous at first on account of its slow development and of the general good health, may become so by the obstacle that it forms to the passage of air.

Justifying an endolaryngeal intervention in the beginning, the fibrotuberculoma can thus be cured without danger of a relapse. If the endolaryngeal operation is no longer possible on account of the extension of the lesions, all partial or total laryngectomy must be abstained from and palliative tracheotomy performed.

As the writer remarks, cases of fibrotuberculome mistaken for cancer and operated upon as such are doubtless more numerous than the medical world supposes. His work is another proof that no intervention can be practiced on a larynx without a previous histologic examination.

Dangers, Failures and Difficulties in Foreign Body Bronchoscopy: A New Instrument for Their Elimination.

Goodloe, A. Ellis.
Am. J. Surg., N. York, 1920—LXXIV—207.

The instrument presents the following features:

1. A combined bronchoscope and forceps so constructed that it will grasp practically any object of any shape and any size that may find its way into the trachea or bronchi, doing away, in the majority of cases, with the use of forceps of many and various shapes and sizes, which are used through the barrel.
2. Vision is had at all times, whether the forceps is closed, being opened or open, as there is no instrumentation through the barrel.
3. There can be no shadows cast upon the object on the field of operation or within the barrel.
4. It will grasp and hold almost any object, whether hard and round like a glass ball, or a soft substance like the peanut, for it does not depend upon the same principle as other forceps. It has only one thin jaw which passes over the object and closes up the tube behind and, by its lifelike motion, it works objects up to the barrel, and, if small enough, into the barrel.
5. It is easy to tell when arriving at the object to be removed, as the forcep can be lifted up and down by the trigger-like motion of the index finger and the body thus seen to move.

6. There is much less danger of driving the foreign body further down into the deeper bronchi, as there is only one thin forceps blade, instead of two, to pass the object, and it is parallel to the wall of the bronchus.

7. Impacted bodies can be worked loose and the process watched while it is being done, by a simple up and down motion of the forceps blades, without disturbing the relation of the forceps blade to the end of the barrel or the object.

8. If secretions too thick and tenacious to be drawn through the suction tube get in the way obscuring the view, they may be pushed aside with the forceps blade.

9. Abscesses with small openings into the lumen of the trachea or bronchi may be opened and enlarged, allowing pent up secretions to escape.

10. While the bronchoscope is being withdrawn, with the foreign body within its grasp, it can be seen whether or not it remains within the grasp until fully withdrawn. This is not possible with the forceps which have to be used through the barrel. Often a foreign body has been lost during the withdrawal.

11. By regulating the friction control screw at the head, just sufficient tension can be obtained, not to crush soft bodies of vegetable composition, such as peanuts and beans. An extra strong grasp can be obtained by the process being reversed. This feature can also be controlled by the thumb control, without disturbing the screw.

12. Granulating tissue can be curetted away where the object has become embedded in it. The shape and size of the forceps together with its double motion makes it an excellent curette, when needed, and it is always there, ready.

13. Unless the secretions are exceptionally thick and tenacious, it is impossible to obscure the light, due to the mechanical arrangement of the light and the drainage tube. The opening of the drainage tube into the barrel is in front and at the apex of the light bulb, and the secretion is taken up before it reaches the light. Every part of the tube can be taken instantly apart for cleaning and sterilization.

14. It takes only one hand to operate.

15. If occasion should arise where the operator should choose to use forceps or hooks, they can be employed in the usual way, as the above added features have not decreased the lumen of the standard size bronchoscope, neither have they increased the size of the tube.

Emil Mayer.

V.—MISCELLANEOUS.

Enlarged Thymus Gland in Infancy and Its Treatment by Radium.

Brayton, Howard W., and Heublein, Arthur C.

Bos. M. and Surg. J., 1919—CLXXXI—26.

Med. Rec., 1920—XCVII—77.

The writers base this report on an experience of thirty-four cases of enlarged thymus treated with radium. In every instance there followed a prompt and lasting disappearance of all symptoms. The technic of the treatment is as follows: 100 milligrams of radium element, still in its 0.3 millimeter silver capsule, is wrapped in sufficient gauze so that when strapped to the breast by a strip of adhesive it will lie a half inch from the skin surface. Four marks are made in the form of a rectangle over the thymic area and the nurse is instructed to allow the package to remain two hours over each mark. This makes a total exposure of 800 milligram hours. From the moment a diagnosis of enlarged thymus is made the child's head should be kept in a fixed position, thus lessening the severity of the asthma and the possibility of sudden death. Radium possesses the following advantages over the Roentgen ray in the treatment of these cases: The action of radium is more rapid: with radium one treatment alone suffices to effect a cure, even in the severest forms of the disease; radium is portable, thus obviating the difficulty of transporting the patient to a Roentgen laboratory; the application of radium is simple, thus eliminating the dangerous element of fear from the mind of the patient, and at the same time rendering unnecessary the use of an elaborate equipment and highly skilled operator.

Emil Mayer.

Frequency of Syphilis With Cancer of the Lips, Tongue and Buccal Mucous Membrane.

Cary, N. Austin.

J. Am. M. Ass., Chicago, 1920—LXXV—860.

Syphilis in association with cancer of the tongue is approximately three times more common than in association with cancer in other locations about the mouth—14.5 per cent, or about one in seven cases.

This very fact is urgent reason against protracted antisyphilitic treatment in tongue lesions which may be cancer, even in the presence of positive evidence of syphilis. Regardless of the causal relationship of syphilis to cancer, once a neoplasm has been established the prognosis is that of cancer and not of syphilis, and treating the syphilis will not affect the cancer, but will only delay urgently needed surgery. Emil Mayer.

Radium in the Treatment of Malignant Tumors of the Nose and Throat.

Sonnenschein, Robert.

J. Am. M. Ass., Chicago, 1920—LXXV—865.

The writer presents the following conclusions:

1. The future of radium therapy seems very bright, particularly in reference to applications in tumors of the nose and throat; but great caution is advisable in statements regarding actual cures. It is important to watch for recurrences during a period of from two to five years.
2. In reporting cases, authors should give details of the preparation used, the method of application, duration of exposure, etc., in radium treatments.
3. Following up the cases and repeating on them again whenever possible is of utmost importance in the formulation of definite conclusions regarding the results of radium treatment.

4. Radium is probably of great value before, and certainly after operations. It is very efficient in relieving pain, hemorrhage, discharge, etc., in many inoperable cases.

5. Sarcomas are especially responsive to radiation; the carcinomas yield much less readily, and the squamous type of epithelioma is scarcely amenable to radium at all.

6. Complications, at least those reported, are not so frequent as one would be likely to expect. Burns were the most common ones, but even death may result from toxemia.

7. Radium has many advantages as compared with roentgen rays, especially for application in the nose and throat.

8. The diagnosis of the malignant cases should be made by a competent laryngologist, and the radium applied either by him or in cooperation with a radiologist. Only in this way will correct statistics and reliable results be obtained, with greatest benefit to the patient and the safest guidance to the profession.

Emil Mayer.

Mixed Tumors of the Thorat, Mouth and Face.

New, G. B.

J. Am. M. Ass., Chicago, 1920—LXXV—732.

Patients with mixed tumors usually come for examination because of recent increase in the size of the tumor, which has been present for several years. Thirty-three, nearly half of the tumors, had been present for more than five years before the patient came for examination. This type of tumor presents, clinically, a hard, nodular surface, with the feel of a malignant growth. Such tumors in the pharynx are usually located laterally, or bulging the posterior pharyngeal wall and the palate.

The patients, because of the slow growth of the tumors, accustom themselves to the gradual diminution of the air space and small space through which to swallow. It is remarkable that some patients are able to eat anything with the huge tumor filling the mouth and pharynx. In one the growth, which had originated in the hard palate, had extended upward and involved the entire antrum. When the tumors are situaed on the hard palate they usually cause a depression in the bone similar to that produced by a dermoid; as they become larger they may perforate the bone.

When in the parotid region they are freely movable at first, but after they increase in size they become fixed between the posterior margin of the ascending ramus of the jaw and the mastoid region; the facial nerve is sometimes paralyzed from the pressure by the tumor. In the one case in which the larynx was involved, the entire subglottic region was thickened but not ulcerated. The laryngoscopic picture was similar to that seen in two cases of amyloid tumor of the larynx. The patient had been gradually having increased dyspnea for eight years. Microscopic examination of the tissue determined the diagnosis in this case. The fact that there is never any close connection either grossly or microscopically between the salivary glands and the tumors seems to discount the theory that they arise from the gland substance; they are always surrounded by a definite capsule and not connected with the gland. Grossly, they present a definite capsule, are rounded, smooth and lobulated. The slowly growing tumors are usually hard, while the rapidly growing ones are soft. Some are multiple. On section, they are granular in appearance with some cystic areas filled with serum. Microscopically, they present connective tissue and epithelium in the form of tubules. The majority of the tumors contain cartilage.

If the growth is in the pharynx and palate, the condition must be distinguished from a nasopharyngeal fibroma that has filled the nasopharynx and bulges the palate. In the parotid and submaxillary regions, tuberculous and inflammatory glands may simulate a mixed tumor.

The treatment of the mixed tumor is surgical. If the tumor is in the pharynx it should be removed either through the mouth or through the submaxillary and submental regions, depending on the size and location of the tumor. Of the four pharyngeal tumors for which the operation was performed, two were removed through the mouth and two through the submaxillary region.

Five of eighteen patients who, at the time of examination, had been operated on elsewhere had permanent facial paralysis.

This type of tumor should not be classified as mixed tumor of the salivary glands until there is some evidence to show that it is related to these glands. The tumor may be present in various locations in the throat, mouth and face. It seems that a favorable prognosis in these cases depends on the complete removal of the tumor at the primary operation, as the percentage of recurrence following complete removal is very small. Emil Mayer.

Postdiphtheritic Paralysis of the Respiratory Muscles.

Marriott, W. McKim.

J. Am. M. Ass., Chicago, 1920—LXXV—668-669.

About one week following the attack of diphtheria the child began to show signs of palatal paralysis. The muscles of the eyes, extremities, back and neck subsequently became paralyzed.

The child's respiratory difficulties increased. No motion of the diaphragm could be detected, and ultimately the intercostal muscles and accessory muscles of respiration became involved. Cyanosis deepened and the child became semicomatose. There were no signs of pneumonia or of obstruction in the air passages. It was evident that death from suffocation would result within a very short time unless some means of artificial respiration were employed.

Use was made of an apparatus described by Gesell and Erlanger. This apparatus was designed to convert a continuous air current into an intermittent one of any desired rate and volume, and has been used extensively in physiologic laboratories for administering artificial respiration to animals. A nitrous oxid mask connected to the apparatus was applied closely to the child's face. There was at first no cooperation, partly on account of the child's semicomatose condition. Within a few moments, however, the slight cooperation necessary was obtained, and air was forced into the lungs. The effect was almost immediate; cyanosis disappeared, and the patient became sufficiently conscious to cooperate well. The rate of respiration of the machine was adjusted to correspond with the child's respiratory efforts. After a period of about ten minuets the child fell asleep and the mask was removed. Cyanosis slowly developed again and was again relieved by a period of artificial respiration. The artificial respiration was kept up during most of the time that the child was awake. It was possible to discontinue it for short periods when she dropped off to sleep. The artificial respiration was kept up at intervals for five days, and at the end of that time the respiratory muscles had so far regained their function that the artificial respiration was necessary only at relatively infrequent intervals. It was not neecssary at all when the child was perfectly quiet; but after any exertion, such as coughing or after feeding with the nasal tube, it was necessary to apply the respiration apparatus for a short period. The function of the respiratory muscles steadily improved, and at the end of a week it was possible to dispense entirely with the artificial respiration. The child was discharged from the hospital January 31, in excellent condition. She is now (six months later) well and apparently normal in every way. Emil Mayer.

SOCIETY PROCEEDINGS.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of December 1, 1919.

THE PRESIDENT, DR. ELMER L. KENYON, IN THE CHAIR.

Bone Transplant in the Nose.

Dr. George W. Boot presented a patient with a bone transplant in the nose, (2) a patient who had suffered with cerebral hemorrhage, and (3) a case of brain abscess.

Case 3.—The patient was a woman, aged 35, married and the mother of two children. She complained of dizziness and of pains in the left ear.

The left ear began to discharge with an attack of scarlet fever at the age of 12. The discharge ceased after a time, but began again at the age of 29 and has persisted ever since. She was referred to Dr. Boot to have a radical mastoid operation to put an end to the discharge and to the dangers of a chronic suppurative otitis media.

Accordingly, a radical mastoid operation was done. During the operation the dura over the tegmen antri was exposed but was not injured in any way. The antrum was very small, and the mastoid was eburnated from the long continued discharge.

She did very well after the operation until the eighth day, when she complained of a bad headache, for which she was given phenacetin in five grain doses.

On the ninth day she appeared somewhat stupid in her actions and would not protrude her tongue when told to. She did not complain of headache, and no disturbance of speech was noted other than what seemed attributable to her rather stupid condition. She appeared obstinate rather than aphasic. Her temperature at this time was 98.6 and her pulse 60.

On the tenth day her morning temperature was 98.6 and her pulse 60. She was decidedly stuporous. She would not protrude the tongue, and when she talked she acted decidedly sleepy. The nurse reported her talk as irrational at times. There was no rigidity of the neck and Kernig was absent. There was no vomiting. Lumbar puncture gave a clear fluid with no appreciable increase in pressure. There were 132 cells to the cubic millimeter of the spinal fluid. The pupils were equal and reacted to light. The eyegrounds were negative except for a slight fullness of the veins. There was no choked disc.

On the eleventh day she was still more stuporous. Babinski and Gordon reflexes were found positive, and all the deep reflexes were somewhat increased. At this time it was found that light thrown into the right eye from the right gave no contraction of the pupil, while light thrown into the right eye from the left caused contraction. The left eye was not responsive on account of a mydriatic having been used the preecding day. It was difficult to get her to reply to questions. There was no nystagmus.

A diagnosis of abscess of the left temporosphenoidal lobe was made. Operation was done a few hours later. The mastoid wound was reopened and the tegmen removed over an area 1.5 to 2 cm. in diameter. The granulating dura was incised and the searcher passed upwards about 1.5 cm., when there was a gush of thin brownish pus about 15 to 20 cc. in amount. This was accompanied by considerable bubbling and a foul odor as if from a colon bacillus infection.

A split rubber tube was introduced to the depth of the abscess cavity and dressings applied. The following morning she was quiet and apparently better, but did not speak. During the afternoon she awoke from sleep and spoke quite rationally, and from this time on she improved steadily until she is as you see her now, completely recovered with the ear quite dry.

The symptom to which he called especial attention was the loss of reflex contraction of the pupil when the light was thrown on the half of the retina supplied by the left cerebral hemisphere.

DISCUSSION.

Dr. Stein asked whether Dr. Boot had any special object in transplanting the pieces of tibia in the nose case in two stages, or whether it was an afterthought, and also why he used tibial bone in place of rib. He thought there was a depression just above the tip of the nose.

Dr. Boot said that it was an afterthought, but he believed it was better to do it in two stages than to have to remove some of the bone. He expected to put in a wedge shaped piece later to remedy the depression referred to.

Dr. Long said he had done some similar work. In one case he dissected around the nares, dissecting the skin up to the bridge of the nose, and took a strip of the eighth rib, containing bone and cartilage, and inserted it beneath the skin along the top of the nose. This procedure obviated a scar over the bridge and gave a large high nose, which was the object of the operation. A small portion of the bony rib was cancellous, and some days later the skin over this spot became red, and a small area of fluctuation appeared; an incision was made and a few drops of pus were removed. Daily dressings for ten days resulted in a complete closure of the wound, and the patient was discharged with a perfectly normal nose, as I hope to show you at some future time.

Dr. Boot said one reason that he did not take a piece of rib for his work was because in a similar case another laryngologist took a piece of rib, and an empyema developed which required a couple of operations by a general surgeon.

Bullet Wound of Larynx.

Dr. Edwin McGinnis presented a soldier who had been shot through the neck at the battle of the Argonne. The following day a tracheotomy was performed; five weeks afterward the tube was removed and for ten days the patient apparently did well. He then became short of breath, the tracheotomy was repeated and the tube reinserted. Following this he wore the tube for a year. The bullet had passed through the ventricle, and there was a band of adhesions from one side to the other with a very small opening. He could breathe fairly well through the larynx with a cork in the tracheotomy tube, but did not get enough air to enable him to run or go upstairs. In February, 1919, the scar tissue was incised and bougies were passed. In October he made an effort by the indirect method to cut out the scar, but this was unsuccessful, so the suspension operation was resorted to on the 16th of November and the scar was dissected out with both hands, using grasping forceps and a long scalpel, leaving a clean looking larynx. At the time of presentation the tube had been removed for a week and the larynx looked almost normal. No intubation tube had been used after the operation; there was no edema and very little swelling following the operation.

Dr. L. W. Dean and Dr. M. Armstrong, Iowa City, Iowa, presented a paper entitled

"The Occasional Necessity of Doing Radical Operations on the Paranasal Sinuses in Children, with Illustrated Cases."*

DISCUSSION.

Dr. Sonnenschein said that he had recently visited Dr. Dean and witnessed the excellent work he was doing. The prevailing notions that he and many others had had concerning the size and development of the sinuses in early childhood had been changed through reading Dr. Dean's articles in the last few years. While it was true that in the majority of infants only the antra and ethmoids were developed to any extent, it had been shown by a number of men that it was possible to have very large sinuses in early childhood. The frequency of the inflammations and the bearing they had upon arthritic changes, he thought, could not be better emphasized than by the work Dr. Dean had done. He had seen the two cases reported and wished to testify as to the thoroughness and conservatism with which they were handled by Dr. Dean. In puncturing the antrum, even in small children, by rotating the inferior turbinate and conserving all the mucosa and ciliated epithelium there, he thought the Doctor had done excellent work. The patients were certainly much improved over their status of a few months before, and he could not think of any more important work than calling attention to this region in connection with infected sinuses, especially in the cases in which tonsils and adenods had been removed.

Dr. Beck said that two men in this country had given attention to infectious diseases in children, Dr. Dean and Dr. Oppenheimer in New York. Dr. Oppenheimer several years ago presented an article on sinusitis in children, which had been overlooked by the majority of ophthalmologists, who considered it a useless proposition to try to do anything with the sinuses in children. The reason was that in the discussion of this paper the proposition of doing any active surgical work on children was so unfavorably considered that it was put aside, and not until Dr. Dean and Dr. Oppenheimer presented their papers, with extensive laboratory work, did the men begin to take it up. In the meantime Dr. Coffin of New York presented a number of cases of diseased sinuses in children, in which very successful work had been performed with a suction apparatus which worked successfully in his own cases and many others. Dr. Beck had shown many X-ray pictures of children with infected sinuses, many with large frontal sinuses. and many different pictures of the sphenoid sinuses. Dr. Dean, who had worked a great deal in developing the accessory sinuses in children, had shown that the current belief regarding the sinuses was anatomically wrong. The speaker had no experience in operating in arthritis in children, such as Dr. Dean described. Puncturing the antrum was probably the limit of his work, except in asthmatics. He had done a good deal of work on nonsuppurating cases and had found a good many of them infected. He thought the work of Dr. Dean was admirable, and had made the profession look for sinus disease. He believed it would be well for the pediatricians to be made acquainted with this work.

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*See page 602.

Dr. Norcross asked Dr. Dean to tell something of the less radical treatment in childhood, and whether in a young child the ordinary procedure of puncture was done without anesthetic or if the children were put to sleep.

Dr. Robertson thought the paper was very appropriate at this time. The pediatricians and general practitioners had received the impression that rheumatism, if not a gastrointestinal affair, must be tonsillar or dental. He had expected to hear Dr. Dean call attention to younger children; a child of fourteen was nearly adolescent and should have almost as large sinuses as a man of twenty-one. He had heard of children of seven being operated on for sinus trouble and in one instance no sinus was found. The sinuses vary in different individuals as to their appearance; some come very late, whereas others are developed at a much earlier age. At birth, the largest sinus of all, the antrum of Highmore, is nothing more than a slit internal to the infraorbital canal, which gradually descends, and after the upper teeth are erupted the sinuses develop. He believed the size of the sinus was represented by the growth of the face, and before the face was formed no one could expect to find much of any sinus. In growing children the bones of the ear were almost as large as in the adult. He thought there were many cases which were operated on and relieved of infected foci. The general belief was that the tonsils and the teeth were largely the faulty agents, whereas on looking through his cases a large number were found to have discharges from the nasal and accessory sinuses, particularly the ethmoid cells.

Dr. Robertson thought Dr. Dean should be complimented for the way he had worked out his material. He thought the paper would do everybody good and would stimulate members to take up the work and try to do it as well as Dr. Dean had.

Dr. Pollock said that two years ago he had a patient, aged six years, who was troubled with a "running nose," especially in winter. Examination showed the typical degenerated tonsils and adenoids, which he removed. He saw the patient at intervals afterward and he was apparently cured. Three months previously the mother had brought the child, now eight years old, with a unilateral discharge from the right side. He immediately thought of a foreign body, but careful examination revealed nothing. Transillumination showed the right sinus dark and the antra on both sides quite large. This was the first time that he had discovered definite antrum trouble in a child. He irrigated the antrum with a small trocar. The child made no complaint and the procedure was repeated seven or eight times, every second day, until the discharge ceased. Two weeks later a radiograph showed a slight shadow, so he irrigated again but found no pus. The pus showed staphylococcus. Since then the patient has been perfectly well. He had discussed the case with several colleagues, but had found no one who had ever irrigated an antrum in a patient younger than eight years.

Dr. Maclay emphasized the amount of time Dr. Dean had spent before coming to the opinion that radical work should be done. The cases were carefully examined and treated without any operative procedure for weeks before surgical interference was suggested. The medical profession swung in extremes, and when this paper was read by the various laryngologists in the country and they saw that such work was productive of good results, many operations would be done, hoping for such results as those obtained by Dr. Dean. No doubt extreme care must be exercised in order not to traumatize these young and delicate sinuses. He thought the profession should bear in mind the time spent before deciding to do radical work. Other lines of treatment should always be tried and many cases would clear up. In many of his own cases he had watched children clear up when the trouble had looked rather severe, and he felt that this point should be emphasized.

Dr. Dean (closing) said he was glad to have Dr. Maclay call attention to the length of time cases with nasal sinus disease should be studied before deciding upon the radical operative procedure. He felt that every one of us was opposed to extensive operations upon the nasal sinuses, even in the adult. It was doubly important to avoid radical operations in children; first, beause of the deleterious effects that must result from such operations, and second, because almost all of the cases could be cured without extensive operative procedures.

He was glad Dr. Beck mentioned the work of Dr. Oppenheimer and that of Dr. Coffin. Coffin was one of the pioneers in this field. Oppenheimer has done most excellent bacteriologic work.

In regard to methods of treatment, he felt he was not ready to answer the question definitely at this time. Considerable research work along this line was being done at the University of Iowa, and he expected to report it in the spring.

He called attention to the great care necessary in the puncturing or washing out the Highmorian antra in infants. If the wall of the antrum was scratched, osteomyelitis might develop. In puncturing and irrigating the Highmorian antra in infants he used chloroform anesthesia, and always had before him an X-ray plate of the sinuses in order to know just where the sinus was and its outline. He did not consider it safe to puncture the Highmorian antra in infants without having the X-ray plates before him.

He was glad to hear from Dr. Robertson. One of the patients mentioned was twelve and the other thirteen. He realized they were getting near the dividing line between childhood and adolescence.

In puncturing he used a needle with a caliber of one and one-half millimeters. Before introducing it the inferior meatus was cleansed with 95 per cent alcohol. The needle was then passed into the antrum underneath the inferior turbinate. A second fine needle was then introduced into the antrum through the first. Attached to the second needle was a syringe containing about a dram of sterile water. This water was injected into the antrum, washed around and then aspirated. In this way material for culture was secured. If methylene was applied about the ostium of the sinus before investigating it, the methylene blue did not make its appearance in the washing. Again, the normal antra have been found sterile. These two things indicated that the technic was exact. After securing the solution a silver preparation was usually injected into the antrum.

Dr. David J. Davis presented a paper on

"Some Observations on the Bacteriology of the Palatine Tonsils."

Attention was called to the necessity of studying intensively a suspected focus of infection like the tonsil in both normal and infected persons.

Lymphoid structures attain their maxima in the throat and in the region of the ileocecal valve and appendix, and these maxima correspond in general to the normal distribution of bacteria in the alimentary canal. At these points also the greatest number of pathogenic microorganisms attack the body.

Plasma cells appear shortly after birth (therefore after infection) under the mucosa, and their presence probably indicates chronic absorption of infections and other material.

Certain organisms injected into the crypts of the tonsils disappear in a few days. Miss Sexsmith showed that B. prodigiosus after injection had completely died out at the end of the fourth day. B. pyocyaneus had disappeared by the fifth day. The flora normally found in the tonsils is a restricted one.

Actinomyces-like granules composed of fusiform bacilli, streptococci and spirochetes growing together appear as more or less normal inhabitants of the crypts. Here may be an important source of B. fusiformis in certain conditions about the mouth caused by this organism.

In 1912, in studying the bacteriology of the tonsils from various diseases, including arthritis, nephritis and myocarditis, the writer was struck with the common occurrence of typical hemolytic streptococci in the crypts, often in pure culture, whereas on the surface of the same tonsils they were often few or absent, while the green producing cocci predominated. In forty-eight cases of the foregoing diseases the hemolytic streptococcus was predominant or abundant in forty-five, or 94 per cent. In a series of sixty-one pairs of tonsils, which were extirpated mostly from children for various reasons, chiefly hypertrophy, many appeared quite normal, and hemolytic streptococci were found practically as often, namely, in fifty-five, or 90 per cent. In subsequent work the cultivation of numerous tonsils from a variety of diseases had convinced him that the crypts of the tonsils are in almost all cases the habitat of many hemolytic streptococci, often almost pure. Pilot and Davis have again recently investigated this matter and compared the tonsillar crypt flora with throat swab and tonsil surface cultures. Briefly, in one hundred cases of ordinary hypertrophy without inflammation, the pharynx was positive for hemolytic streptococci in 43 per cent and the tonsil surface in 61 per cent, and in these the hemolytic colonies numbered less than 10 per cent of the total number of colonies. In the crypts of the same tonsils after extirpation the hemolytic streptococci were found in 97 per cent of the tonsils and in most of these were greatly predominant. Furthermore, they found that in twenty-four normal persons cultures from the surface of tonsils revealed hemolytic streptococci in 58 per cent, usually not predominant. In nineteen persons without tonsils, cultures from the pharynx and tonsillar region yielded hemolytic streptococci in only three, or 15 per cent. The recent work of Nichols and Bryan in the United States Army was quite in accord with these data and indicated that the crypts of the tonsils are a common habitat for hemolytic streptococci.

The hemolytic streptococci found in tonsils and in throats of apparently normal persons seem to be typical in every respect. For rabbits many of them are distinctly pathogenic, as pathogenic as many strains from sore throats or from abscesses. According to Holman's classification, they would fall chiefly into the S. pyogenes and S. anginosus groups.

He knew of no other anatomic structure or location in the body that so consistently harbored hemolytic streptococci as do the tonsillar crypts. In the nose they are rare. He had never found them persistently present in a normal nasal mucosa, and their presence there meant almost surely an infection, usually an infected sinus. In the pharynx of normal persons, as they have seen, they are found roughly in between 50 and 60 per cent, but in the absence of inflammation not in large numbers. He raised the question as to the possibility of the tonsil crypts being the chief feeding focus of hemolytic streptococci for the throat and the respiratory passages. In a few cases in which he had examined adenoids he was not convinced that they were an important habitat for streptococci, though they might be found in moderate numbers in the hypertrophied tissues. About the mouth and teeth infected foci may commonly be feeders of streptococci for the throat; but the normal gums do not harbor them in large numbers. The skin of persons who bathe regularly rarely harbors hemolytic streptococci. Schachter found no hemolytic streptococci on the bodies of thirty-eight clean persons; whereas, he isolated hemolytic streptococci from the skin eight times from eighty-nine filthy persons, usually from the hairy parts of the body. They were not numerous, but were typical and virulent for rabbits. The source of such organisms might very well have been the buccal secretions. Hemolytic streptococci, when placed experimentally on the human skin, usually disappeared in a few hours and were readily removed by washing. The gastrointestinal tract seemed to be quite free from hemolytic streptococci, at least normally.

Summing up these observations on the distribution of hemolytic streptococci, the facts pointed strongly to the crypts of the tonsils as being the main and in a sense a normal habitat of these organisms in the human body. Perhaps they were as normal to the tonsil crypts as was streptococcus viridans to the buccal mucosa, staphylococcus albus to the skin, or the colon bacillus to the intestine. From here they might be disseminated to adjacent tissues, ready possibly to take advantage of certain conditions, especially diseases of the respiratory tract, and give rise to secondary infections of a most serious nature.

The question arose as to whether or not persons were commonly or usually infected with their own hemolytic streptococci (endogenous) or were the invading streptococci in infected persons of foreign origin (exogenous). No doubt the latter statement was often true, as seemed clearly proved in the case of sore throat epidemics of milk origin. Furthermore, many facts pointed to the common dissemination of streptococci by means of droplet infection. The route of infection was not so clear, however, in secondary streptococcus infections following other diseases. In the common terminal infections so often due to this organism there was little doubt that the individual was killed by his own streptococci. It had been pointed out that such streptococci were as virulent as epidemic streptococci for man, especially after growing in the body for a time. It seemed reasonable to assume, as had been assumed by some in connection with the epidemics of streptococcus empyemas in the military camps in 1917, that individuals are infected from time to time with their own streptococci, especially following the contagious diseases, and that by this process the streptococci become more and more virulent and aggressive, reaching a point ultimately at which the small doses contained in infected droplets in eating utensils or in other vehicles are sufficient to transmit the disease to a normal person. Thus a secondary invader might become transformed into a dangerous primary infective agent.

DISCUSSION.

Dr. Norcross said that a number of years ago that article was published in which the removal of the tonsils was advocated in every child who had reached four years of age. The author stated that he had never seen a child have diphtheria who had had his tonsils removed. Dr. Norcross felt that most of the serious complications which follow infectious diseases in childhood were associated with streptococcic infection, and while the primary disease might be mild, the complications might be quite severe. There seemed to be a symbiosis between the streptococci and the invading organism. Dr. Davis stated in his paper that nearly 100 per cent of the cases examined contained hemolytic streptococci, so that by the removal of the tonsils the danger of secondary infection would necessarily be decreased. If practically all the tonsils contain hemolytic streptococci, there would be no reason for making a bacteriologic examination of the tonsils before removal. If, however, the different strains of streptococci could be differentiated very often, but to, as Dr. Norcross had suggested, allow Dr. Davis so that one could identify the virulent from the nonvirulent, then a bacteriologic examination of the tonsils would be helpful. He hoped that Dr. Davis would soon be able to report that such differentiation could be made.

Dr. Hayden felt that the society was greatly indebted to Dr. Davis for his scientific work. He did not agree with Dr. Norcross in suggesting that further routine examinations of the tonsils were not necessary, but thought that in the light of Dr. Davis' work the most careful and minute bacteriologic examination was still in order, not to demonstrate that certain organisms were found but to differentiate between these streptococci until the pathogenic ones could be recognized.

In regard to finding spirochetae in tonsils, an experience of Dr. Hayden's some years ago might be of interest. A man who was doing many tonsillectomies sustained a wound of the right index finger. About three weeks later a nurse called his attention to the fact that the finger had not yet healed. The following day some scrapings were made of the sore and very active spirochetae were found. They were not of syphilitic origin, as laboratory tests proved, and subsequent Wassermann reactions, and evidence of any form of syphilis was entirely absent. This was five years ago. Dr. Hayden had never heard of any syphilitic infection being sustained in this way.

Dr. J. Holinger stated that he had had occasion often to talk this matter over with Dr. Davis when Dr. Davis was pathologist to St. Joseph's Hospital. At that time they could not see so clearly, and they did not have the epidemic with the great amount of good work which threw light in many dark corners and which so effectively drew attention to the hemolytic streptococcus. Going back to the original theory of Pfeifer that the influenza bacillus opened the road for the streptococcus to enter the body and then disappeared, that originally the influenza bacillus was, if not harmless, possessed of only a very brief pathogenicity, but that after disappearing many other organisms were found in the throat and mouth and caused other infections. Dr. Davis had presented valuable facts. Were there any tests made with remedies for diminishing the flora in the mouth and throat? A comparative study of the flora of the mouth, throat and crypts after different applications with swabs and atomizer would be of interest, especially their influence on the contents of streptococcus hemolyticus. He thought this might not be a waste of time and energy. He had the impression that a number of surprising facts might be brought to light. He based this impression on an experience on his own person. During a very bad attack of pharyngitis and tonsillitis he had used swabs and applications of different kinds, weak and strong solutions of nitrate of silver, of bichlorid, Lugol's solution, etc. By long contact of the swabs with the infected tissues the attempt was made to reach the organisms in the tissues. All without avail. Finally an atomizer with equal parts of peroxid and water gave more relief in an hour than all other medications in ten days. In other cases he saw similar results. Of course, he did not mention this to advertise the use of peroxid, but it seemed peculiar that a remedy with such superficial action should be efficient at the same time that others failed which were calculated to reach the depth of the tissues if the infection was located deep in the tissues and in the crypts, as Dr. Davis demonstrated.

Dr. George W. Boot thought some of the speakers had the idea that the streptococcus was present in all tonsils and justified their removal, and asked whether the presence of the staphylococcus albus on the skin of all patients would justify removing the skin, and the presence of the colon bacillus in all colons would justify removal of the colons.

Dr. Davis (closing) said that the differentiation of various strains of hemolytic throat streptococci had been and then was a burning question. So far, satisfactory results had not been obtained. From the normal throat and tonsils one recovered hemolytic streptococci quite like those from pathologic tonsils and throats. Both might be equally virulent for various experimental animals. There seemed to be little parallelism between the virulence of hemolytic streptococci for the human and for many animals. According to certain recent workers, the streptococci fell in more or less definite groups or types, but these had not been correlated definitely with virulence for humans or animals or with definite clinical infections or pathouogic lesions. It would appear that the virulence of these cocci was a transient and variable characteristic at times. It would also appear that their aggressive powers might depend largely upon certain delicate and fluctuating factors resident in the host. Similar problems arose in connection with studies on staphylococcus and colon bacillus infections. In the solution of such problems both the properties of the bacteria and the properties of the host had to be carefully taken into consideration.

As to the diminution of the streptococci in the mouth, he thought the simple method of keeping the mouth clean, particularly the teeth, would diminish their numbers. The crypts in the tonsils were difficult to clean. It had been observed that individuals who were without tonsils were relatively free from hemolytic streptococcic infection of the throat, or if they acquired it they recovered more promptly. Normally, too, they had far fewer hemolytic streptococci.

Dr. Davis stated that he was not interested in this question from the standpoint of the practice of medicine, and the studies were not made from that viewpoint. He did not wish to be understood as advocating any such procedure as universal tonsillectomy; he did not feel competent to make any statement about it at present. Because there was evidence that practically all tonsils are infected did not mean that they should all be extirpated.

The whole problem of tonsil infections was in a very unsatisfactory state, and he felt that bacteriologic examination, as at present made, did not mean very much. If in the tonsils a definite abscess containing pus was found and there was an associated pathologic condition suggesting a relationship surgical procedure would be justified.

One should always take into consideration the clinical, the bacteriologic and the pathologic features in all cases when making a diagnosis and considering treatment, and should not rely on a bacteriologic examination alone.

Dr. Alfred Lewy asked whether experiments had been made on animals to determine whether the bacteria found in the normal crypts of the tonsils of the animals were pathogenic to those animals.

Dr. Davis, replying, stated that Sherman had recently shown that hemolytic streptococci from dogs' tonsils were very similar to those found in the human being They were virulent for rabbits, but he thought they had not been injected into dogs.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of February 2, 1920.

THE PRESIDENT, DR. ALFRED LEWY, IN THE CHAIR.

Dr. Edwin McGinnis read a paper entitled

"The Intranasal Drainage of the Frontal Sinus and Anterior Ethmoid Cells.*

DISCUSSION.

Dr. George E. Shambaugh complimented Dr. McGinnis on his discussion of an interesting subject. Dr. Shambaugh has for many years advocated the intranasal route as the operation of choice for both acute and chronic cases of frontal sinus disease requiring operation. As a matter of fact, an operation of any sort is rarely necessary in the treatment of acute cases. In those cases where it is apparent that the patient has had recurring acute attacks, it is best to secure better ventilation of the sinus by an operation between such attacks. Occasionally, however, in acute cases no spontaneous drainage can be induced. In such cases the severe pain may make it necessary to operate during the attacks. This, however, is quite unusual. The operation here consists of the resection of the anterior end of the concha media and sometimes, in addition, the exenteration of the anterior ethmoid cells.

In chronic cases the situation is somewhat different. Here an exenteration of at least the anterior ethmoid cells is always required. First, because these cells are usually also involved in the inflammatory process, and second, because the establishing of the necessary ample ventilation of the frontal sinus requires this work on the ethmoid.

In cases where the concha media stands out from the lateral wall sufficiently to permit, it has been his practice to operate on the ethmoid and the frontal sinus without disturbing the turbinated body. This prevents the possibility of injuring the cribriform plate. After the work on the ethmoid and the frontal sinus has been completed one can then decide whether to resect the turbinated body. In many cases the middle turbinated body will be found wedged so tightly between the upper and the outer nasal wall that any work on either the ethmoid or the frontal sinus necessitates the primary resection of this body.

The method of entering the frontal sinus by working from behind forward and upward through the anterior ethmoid cells is, he believed, very much safer than the more direct route going more nearly perpendicularly upward in front of the concha media, as advocated by Dr. McGinnis. The danger of forcing a passage into the brain fossa is greater when making the opening straight upward. In the chronic cases he has employed a rasp in securing a larger opening into the sinus. The operation is done under a local anesthesia and in a hospital. No packing is employed unless the bleeding should make one necessary.

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*See page 631.

Dr. Elmer L. Yenkon said that he had the satisfaction of seeing one of Dr. McGinnis' cases. He thought the work the Doctor had presented was important, and that we should be careful not to lose sight of the main point, namely, if he understood correctly, the effort to operate upon the frontal sinus and ethmoid cells for infection and yet leave them essentially unmutilated. If that was a practical thing to do, if it was possible to accomplish this, it was of great importance. Another thing which Dr. McGinnis had in mind, which was also of importance, was the thought that if one could finally do away with acute infection in this region there was no necessity of thinking of operating upon a chronic condition. The basis of this effort in the future in this field should be largely in the prevention of chronicity. Dr. McGinnis offered the proposition that by nondestructive operative efforts chronicity following acute frontal sinus infection should be avoided, if not always, at least usually. He thought that no one could take exception to this simple procedure in acute cases. He did not say it should always be done in acute cases, but it was a simple procedure which was not destructive and could be held in reserve and resorted to if simpler measures failed. Whether Dr McGinnis was too optimistic in regard to chronic infections he did not know, but was inclined to think he was. This operation called for the development of a smaller type of instrument, since the present instruments were not sufficiently small to handle this relatively delicate region accurately enough. These should be developed by Dr. McGinnis and others working along this line.

With respect to the frontal sinus, the occlusion is not due altogether to the frontonasal duct, but also to occlusion in the infundibulum below the duct. He recently had the experience of caring for a congenitally occluded naris in a girl of nineteen. She had never breathed through one side of the nose. In studying this case he learned that day after day mucus accumulated in the nose and there was no way to get it out. There was no force from behind, no "blow" to the nose, and the patient could only keep wiping the serum away as it slowly oozed out. He could see it collecting in the nose and sticking there; he tried to wipe it away but could not get the naris clean because the secretion was so sticky. The only way he could get it clean was by exhaustion. In the drainage of the frontal sinus a sticky pustular secretion comes down into the region below the frontonasal duct, collecting in the swollen infundibulum and damming up the exit below the duct. The stickiness of the secretion without anything from above to force it out made such cases difficult to drain by gravity alone. Under these conditions, unless the drainage happened to be exceedingly free, it was impossible to take care of the condition effectively, except through some such procedure as this operation, and through exhaustion. In his opinion, exhaustion was exceedingly important in the care of the nasal accessory sinus infections.

Dr. Charles Long was averse to operating on these conditions in the acute stage. In his experience most of them got well and before he did any operating he always had a radiograph made, and if he did not find infected cells or cells containing pus, in other words, no pathology, of course no operative procedure would be indicated. On the other hand, if the X-ray findings exhibited infection and the process seemed acute, mild treatment would be indicated, using simple warm alkalin douches and sprays, etc., allowing nature, if possible, to clear up the process. In case of great pain that could not be controlled by medicine, some simple operation would be advised, such as irrigating an antrum or the infraction of a middle turbinate bone to improve the drainage. The traumatism of operations on the nose in these acute inflammatory processes is no different than in the abdominal cavity; it is a dangerous proposition. A treatment of watchful waiting, in a large percentage of cases, means recovery without any operation. On the other hand, if we have not succeeded we have at our hand the operation, and I think the doctor's technic is very appropriate and can be successsfully applied.

Dr. George E. Shambaugh thought that the question which had come up in the discussion as to the indications for any operations in acute cases was a very important one. It was his belief that an operation of any sort was rarely indicated during an acute sinus infection. The only indication which he recognized which justified such a procedure was where the persistence of severe pain and the failure to secure any drainage into the nose made it necessary to resort to surgical measures. The method to be pursued consisted, first, of the resection of the anterior and of the middle turbinate body. This would suffice for most of the cases. If relief was not obtained—that is, if the drainage from the frontal sinus was not established, an effort should then be made, by breaking down the anterior ethmoid cells, to enter the frontal sinus along the natural route. Where he has not been able to force an opening through the nose, an external operation may be required.

Dr. Edwin McGinnis stated that the idea in leaving the middle turbinate was because it formed a bulwark between the anterior ethmoid cells, the antrum and the posterior group, to keep the infection forward, and also preserved the normal contour of the nose.

In operating, the biting is all done by sight. One could look up and see what he was doing and keep biting until the passageway was opened; in two or three cases he could see right up into the sinus.

He had a good deal of experience in treating acute frontal sinusitis with Dr. Ingals with the operation he devised. The cases treated medically had frightful pain for two or three weeks, and if they could be made well within twenty-four hours, why not do it? He knew of no better way of avoiding the chronicity that Dr. Kenyon mentioned.

Dr. Norval H. Pierce said that there was a danger in operating on acute cases. He had known of seven cases, not in his own experience, but among his colleagues, where death had ensued from operation on the middle turbinate body in acute infections of the anterior ethmoid cells. He, therefore, felt that only in those acute cases of intractable pain lasting for more than four days, where the drainage was obviously insufficient, should the danger be assumed of opening up the region, and then the operation should be thorough. In the subacute cases this danger seemed less. In cases where there had been previous attacks with intervals between of apparent normality, the danger was not so great; these intervals might last for weeks or months, but where there was a history of previous attacks, so far as he knew, death had not ensued. The cases he referred to invariably were those where the attack was a primary one and where the operation had taken place within the first week. Further, the danger seemed to diminish if some time elapsed between the onset of symptoms and the operation. The danger was decreased markedly if the operation took place a week or more after the onset.

Dr. Norval H. Pierce discussed the subject of

"Laryngofissure for Carcinoma, with Demonstration of Specimen."*

DISCUSSION.

Dr. Joseph Beck was delighted to discuss the excellent presentation of Dr. Pierce and cited a case of carcinoma of the larynx which he had operated a week or ten days ago, as he thought some of the points in connection with it would be of interest to Dr. Pierce, as he presented the question the Doctor wished to have discussed. A man of fifty was brought to him by Dr. Holding of Madison, for removal of a carcinoma of the larynx which was about the size of the specimen exhibited by Dr. Pierce. A small, unilateral tumor, about one-fourth or perhaps one-half inch in length was situated on the left side of the cord with the greater portion going into the ventricle of the larynx. Motion of the larynx and respiration were not interfered with. The man was well nourished and apparently healthy. Dr. Holding had been in the Memorial Hospital in New York for five years, where radium treatment is used, and requested that radium be used in this case. They considered it an excellent case for operation, so compromised by doing both. Dr. Holding presented him with a reprint from Drs. White and Phipp of New York, who had been experimenting on animals as well as on man, in which they reported definite results from the use of radium preoperatively, following the lethal dose of radium for carcinoma. The lethal dose was figured out in hours, and in this case 150 mg. were applied for twelve hours over the greater portion of the larynx. This was done after examination by direct suspension laryngoscopy, a good sized piece of the tumor being removed and immediately submitted to freezing examination as well as cellodin examination. This required two days. Following this the application of radium was made for twelve hours by a radium expert, according to the technic outlined by the New York gentlemen. The following day the patient was operated on under local anesthesia. An incision was made through the suprahyoid region down to the sternal notch. The tissues were dissected down to the larynx, where they encountered a high median thyroid. This could not be dissected outward but had to be incised, after making it a bloodless operation. A median incision was made and a tube placed in, because they intended to follow the operation by subsequent radium treatment. There was no particular difficulty about the operation, except that the cartilage was almost osseous, but by means of Jackson's scissors they were able to split the larynx; without lateral incision of the thyroid membrane they exposed the growth completely and excisd with the knife. The cavity was then packed with a strip of gauze, for what reason he did not know, except that he felt that it was well to keep the larynx in the position it was for subsequent radium treatment. The larynx was allowed to approximate somewhat, although not uniting. Just before the operation was finished the patient had a free emesis, an admost projectile vomiting of the noon meal. He had received one-fourth grain of morphin about half an hour before the operation. He returned to his bed feeling quite well; he complained of no pain during the operation, the pulse was fairly regular, and they thought the operation was a success. During the night he had considerable difficulty with secretion; the gauze was causing irritation and the interne removed the packing, which relieved him. There was considerable secretion in the tracheal tube and in the bronchi, and the interne thought it was necessary to remove this irritation by inserting a sterile catheter under sterile conditions.

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*See page 595.

The following day the patient had a fairly good pulse, but Dr. Beck was not satisfied; he felt that the man was getting more air than he could consume and appeared to be somewhat in shock. In the afternoon the symptoms of shock were so definite and unexplainable that he called in an expert internist to examine the heart and lung. The internist felt that the heart was badly involved and ordered proper medication, but the patient succumbed on the following day.

The speaker did not agree with Dr. Pierce in not resorting to preliminary microscopic examination. He knew quite well how a carcinoma looked, but a definite histologic examination was of some benefit, and by means of the suspension laryngoscopy he believed it was of some advantage.

In regard to the various operations for the cure of carcinoma, such as laryngofissure, hemilaryngectomy, removal of the carcinoma by the indirect method, he thought the best results were obtained from a laryngofissure, using no tube and sewing up the larynx. He had not had many cases, but had had several fatal cases of inoperable carcinoma. He had excised the larynx and part of the esophagus and the glands of the neck, but they all succumbed. The same thing had happened in laryngectomy, even in many cases which he considered excellent, there had been numerous recurrences in most of the cases. Two cases had lived for several years following hemilaryngectomy, but he believed they would have been just as well off with the present technic of laryngofissure.

As to the question of radium and X-rays, he thought the previous radiation which was so thoroughly believed in by the men in the East was a question in reference to what Fenger called attention to many years ago, of the production of the higher toxic substances or toxin. These substances develop from decomposition, and he wondered whether the case he cited had not succumbed to some such thing producing the cardiac complication.

Dr. J. Holinger considered the presentation of Dr. Pierce very apropos. Last fall he had an opportunity of performing a laryngofissure on a patient after a diagnosis of carcinoma of the vocal cords was made from the local findings and from microscopic examination of a piece of the tumor. General anesthesia was impossible, because the patient had considerable albumin in his urine and his heart was not in good condition. On the other hand, he was a very common-sense, docile patient, and it was decided to work under local anesthesia. The patient stood the operation well; one-sixth of morphin being given shortly before starting. As soon as the larynx was opened the whole interior was thoroughyy cocainizde and the tumor excised in both directions and from the commissure. The main portion of the tumor was in the median line. With the cocain, adrenalin was used so the bleeding was moderate; no ligatures were necessary. As soon as the growth was removed the larynx was closed by sutures, through the cartilage, and a second row of sutures through the skin. Five days after operation the patient went home and returned two weeks later, when the only abnormality was a small granulating fissure in the middle of the hardly visible scar. He removed the granulation and the patient did well until Christmas, when he had difficulty in breathing. It was found that from the anterior commissure had formed a diaphragm scar to almost the middle of the lumen. This might have been expected, since both to the right and left of the median line tumor masses had to be dissected. Cauterizing by means of trichloracetic acid was tried. This gave relief for a few weeks. The patient returned and a larger part was cut out with a double curette. Dr. Boot had tried to do this under direct laryngoscopy, but was unsuccessful, and Dr. Holinger had to resort to the indirect method. The patient did well, and five months after the operation had gained fourteen pounds. He is a farmer, works out of doors, and has to go a little bit slow, owing to shortness of breath. His chief complaint is that he cannot talk well and cannot smoke.

Dr. Otto J. Stein thought the interesting feature of any operation on the larynx was in those cases that had been operated sufficiently long to judge of the ultimate results. He recalled two cases which he had presented before the society six or seven years ago; one was a man of fifty-four or five and the other was fifty-one. They had both been operated under local anesthesia, and both had been done by injecting the superior laryngeal nerves for anesthesia, preceded by scopalamin and morphin, one-one hundred sixtieth grain, and one-sixth grain each. Infiltration of the soft parts for primary incision down to the thyroid cartilage, the immediate introduction of the tracheotomy tube, and the laryngofissure were performed. There was no particular discomfort and very little bleeding. The cricoid cartilage was preserved in both these cases, although he had cut it in previous cases. The man, aged fifty-one, was accustomed to a good deal of public speaking and had a growth which occupied the anterior half of the right vocal cord, which projected underneath the cord, passed over the commissure to the other side and involved the other cord just at the commissure. In other words, cutting the thyroid cartilage in the median line would cut right through a mass about the size of the end of a finger. This tissue was immediately dissected free and excised with a knife and scissors. Then a considerable portion of the soft tissues above and below were elevated in order to secure a sufficient flap to cover the defect. This he closed in very nicely with catgut. The wound externally was closed primarily, the cartilage not sutured but held in position by the layer suture of muscle, fascia and skin. In previous work he had attempted to sew the cricoid cartilage and found it very difficult, as the sutures pulled through the cartilage or he had to bore through in case of osseous tissue. No packing was used; the tracheotomy tube was left in until the following day and then removed. Both cases were presented two weeks after operation and both were living at present. One of the patients whose case he cited was mayor of his town, had gone through a second campaign and did a good deal of talking. Both cases were of considerable interest because they were both operated under local anesthesia and both did well.

Regarding preliminary diagnosis by removal of tissue for confirmation of the diagnosis, he always did this, probably because of the training he had received. It was very difficult to convince a patient and his relatives of the necessity of what they considered a serious operation without something more confirmatory of the diagnosis than the macroscopic, and he thought best to follow the procedure of preliminary endoscopic removal of tissue to satisfy them. He had never had any difficulty in getting the patients to submit to the operation as outlined after this confirmation. The preliminary removal of tissue had always been done by the indirect method until recently, when he had been using the suspension laryngoscopy, which he thought was far superior to the indirect method.

He had always felt very strongly that laryngofissure was the method for removal of fairly well localized tumors of this character within the larynx, provided they were not complicated by any glandular involvement.

He had never used packing, and thought the local anesthesia had many advantages over the general. He would hesitate to use general anesthesia for this kind of surgery, for it could be done so easily and satisfactorily, with all the advantage of having the patient awake and expelling the secretion that might get into the lungs.

Replying to a question from Dr. Pierce, he stated that he dissected the mucous membrane free above and below and in every direction possible, thus mobilizing the flaps sufficiently to bring them together and cover the defect, where they were sutured with catgut. In a large defect this could not be done, but in his two cases it worked very well.

Dr. Harry L. Pollock thought some of the questions had been answered by the essayist himself. In the cases of small, localized carcinoma he was sure the tracheotomy was not necessary, because he knew how much work could be done within the larynx without any resulting trouble. They had tried it in the cases they had, and one case which Dr. Beck did not mention, a case of this kind with a small carcinoma on one cord which they saw about nine years ago and in which they did a laryngofissure and sewed it up immediately without any tracheotomy tube. In that case there was no difficulty except some slight trouble in swallowing for two days, after which the patient swallowed food. The man was an insurance agent and with the exception of slight hoarseness was as good as ever. In the cases with difficulty in breathing, if they were cyanotic, it was necessary to do a preliminary tracheotomy before even a microscopic examination could be made, and in these cases they did not attempt a laryngofissure, except in some cases in which they used the cautery and left the laryngofissure open. In the small localized growths of one cord he felt that they could be removed very nicely by laryngofissure without preliminary tracheotomy. Very little packing was necessary, because they got along very much better if sewed up at once. It had never, in his experience, been necessary ot do a tracheotomy afterward, as there was no trouble in breathing.

In a case which was diagnosed as carcinoma in a man of sixty, he did a direct laryngoscopy and removed a portion of the growth expecting to get carcinoma, but found nothing but connective tissue and round cell infiltration. He thought he had not gone deep enough in the larynx, so suspended the patient again and went in deeper, but found no sign of malignancy, but did a laryngofissure and removed the growth anyway. He did a preliminary Wassermann test, for the man had been hoarse for several months. He made a flap and got down to the thyroid cartilage and saw a tumor about the size of a hazelnut projecting. He was going to dissect it out, and just as he cut into the membrane a flow of pus began; so he dissected this growth out and put in a drain. Examination showed this tissue to be of the same nonmalignant character. The man had a cellulitis, but made a good recovery and his voice is in good condition and his larynx is absolutely normal. He thought this condition was a perichondritis followed by an abscess.

He thought the experience of most men had been that in the small localized carcinomata it was well not to do a preliminary tracheotomy, not to use packing, and to sew up immediately. He had not seen any pronounced benefit from radium therapy. Even when the cautery was used it was possible to sew up the wound, as there was so little edema following the operation.

Dr. Pierce (closing) said that the cases of carcinoma of the commissure were of special importanc but, as was well known, they were likely to result in webs and scars. Dr. Stein had been very fortunate to be able to make flaps from the anterior portion of the mucosa to cover the defects. It was possible to get material from the posterior mucosa to cover up the defects, but it was rather more difficult to stretch the mucosa of the anterior portion of the larynx. However, even this danger should not preclude the performance of the laryngofissure, because the web or scar was very much more readily dealt with and the patient was in much better condition than if total extirpation was performed.

He realized that his view regarding the preliminary microscopic examination for confirmation of the mirror diagnosis was rather iconoclastic. However, Dr. Pollock substantiated his view. In the case he cited where he was not sure of the diagnosis, where the diagnosis was against carcinoma, yet he did the laryngofissure. The point was that one could not depend upon indirect laryngoscopy for removal of tissue for microscopic examination. He thought practically all laryngologists believed this. In his opinion, there was no doubt that direct laryngoscopy was one of the best methods of doing this. But with a tumor in the larynx, with syphilis excluded, with tuberculosis excluded, the probabilities are that it is carcinoma of the larynx, so why not make the diagnosis at the time of operation without subjecting the patient to all the other more or less demoralizing and depressing experiences? He reserved the right to modify his views at any time, and thanked the members for their attention and for answering his questions so thoroughly.

NEW YORK OTOLOGICAL SOCIETY.

Meeting of January 27, 1920.

Case of Purulent Meningitis and Labyrinthitis Operation—Recovery with Hearing.

Dr. Edmund Prince Fowler: Annie G., age 11 years. Family history negative. Past history: Pertussis and nephritis as a baby. Attended Sea View, Ruptured and Crippled and Staten Island hospitals for cervical Potts' disease and wore brace for three or four years. Since infancy has had a purulent ear discharge, off and on, usually in the winter, but for the past two years both summer and winter, with intermissions. Pain unusually severe just before the renewal of the discharge. No headaches, vertigo or tinnitus until present illness.

Present history: On Nov. 24th, one month before I saw her, she awoke about midnight with severe headache all over the head, but especially in the left ear. Legs so stiff that she could not move them at the knees. Fingers clenched, and hands opened with difficulty. No chills or sweats recalled.

Vomiting violent and vertigo, with sensation of turning to the left—i. e., toward the diseased ear. The room appeared to be turning about her to the right.

Spinal puncture by the Board of Health four times. No organisms but a great increase in cells found. Fluid was hazy to purulent. Polys were 90 per cent to 50 per cent; monos, 50 per cent at first tap; albumen, double plus; globulin, double plus. They will not commit themselves on diagnosis, but were looking for epidemic meningitis.

Enduring one week, all of the aforesaid symptoms subsided gradually, so that the patient resumed her attendance at school for two days, feeling quite well until the evening of the second day when there occurred increasingly severe headaches and sudden projectile vomiting, preceded and accompanied by violent vertigo. This lasted with diminishing intensity for five days.

The slightest head movement would cause it to recur. Closing the eyes did not diminish the vertigo but did lessen the severe headache.

The vertigo was now opposite to that of the prior attack—i. e., she felt as though her body was turning to the right and the room to the left (is very positive as to the direction of the vertigo in this and in the previous attack).

Vomiting always occurred with any exacerbation of the vertigo and with the latter diminished. (I believe it was at this time that the left static labyrinth ceased to functionate.)

On Christmas day the patient got out of bed, but that night vertigo and vomiting again recurred so that she again took to her bed. Two days subsequently she was admitted through Dr. Phillips' clinic to the Manhattan Eye, Ear and Throat Hospital. On admission the patient was so sick that but few hearing or other tests could be made. The tissues over the left mastoid were slightly edematous, the tip was tender on pressure. Discharge profuse, thick and foul. Claimed to hear nothing in left ear. Right ear normal. Vertex forks referred to right (good) ear. No spontaneous nystagmus. Knee jerks absent (may be due to stiffness of knees). Neck very stiff, more so, she thinks, than in former attacks. Kernig positive and the most marked I have ever seen. Babinsky indefinite. Fingers stiff and clenched on palms. Temperature, 102 to 104; pulse, 104; respirations, 24.

Laboratory findings by Dr. Dwyer: Eye fundi: right normal, left little hazy. Ear pus culture shows mixed forms. Blood: leucocytes, 9,800; large monos., 5 per cent; small monos., 21 per cent; total, 26 per cent; polynuclear neutrophiles, 74 per cent; albumen, fairly heavy trace; lactic acid, present; sugar, absent; acetone, absent. Smears showed no organisms but numerous leucocytes. No organisms after 36 hours' tucubation. Urine negative.

The child looked like she was going to die, and until learning the results of Dr. Dwyer's cultures I was determined not to add to her suffering by an operation which appeared hopeless.

Radical mastoid operation was done on December 30, 1919, under gas and ether anesthesia. Pus and necrosis found especially about tip and in and near antrum and posterior wall. The middle ear and antrum were filled with cholesteatoma. Facial nerve was exposed over knee and forward, for about three-eighths to one-half of an inch, and the black necrotic bone about it removed, disclosing the remains of the eternal semicircular canal. This was also removed. No fluid contents of the canal was noted until the vestibule was nearly reached, by way of the ampulla, when seropurulent fluid exuded therefrom.

Dura of middle fossa exposed and regarded as normal. No facial twitchings or eye movements noticeable during or following the operation. A partial facial paralysis appeared at the end of 24 to 36 hours. This has practically cleared up.

The question was now should I stop, having obtained drainage through the small opening into the vestibule, made as described above, or should the labyrinth be uncapped through the promontory or opened further by way of the solid angle?

Having with but the trauma of curetting provided drainage and being fortified by the opinion of Dr. Dwyer, who saw the operation at this critical stage, I stopped. No flap was made or sutures inserted. Wound was flushed with hot saline and with alcohol, and iodoform packing inserted. Time of operation, about forty to forty-five minutes.

After postoperative shock patient steadily improved, stiff neck and Kernig gradually disappeared and within ten days everything was down to normal with the child walking about the ward.

On January 2, 1920, C^1 fork was referred to right side. Right cornea showed rough patch one-fourth inch square at eternal lower pupillary margin. No history of prior eye trouble. No Rhomberg, Argyll-Robertson or unbalance phenomena.

On January 10, 1920, vertex forks were referred to right ear except C^2, which was referred to the left (bad) ear.

Ten rotations to the right in 20 seconds gave no nystagmus, no sense of turning. Ten rotations to the left in 20 seconds gave 12 seconds of nystagmus, on the fifth turn and on stopping for a moment.

Ten rotations to the right gave nystagmus on the fifth turn.

On January 13th, right 10 in 20 seconds gave nystagmus.

Past pointing after rotation to the right was nil. Past pointing after rotation to the left was present for an instant only.

On January 21st, results were as above, but sensed turning to the right after six or seven turns.

Hearing: Right normal, left hears whistle, loud voice and even words with Barany noise apparatus in good ear. Does not hear 16 or 32 D. V. forks in her left ear by bone or air. All other forks are now referred to bad ear.

X-ray and Wassermann negative.

She states that her hearing is now better than for past two years. What lesson, if any, may we learn from this most unusual case? I myself feel that the child is alive and apparently well today because I did not open further the labyrinthine spaces.

In the discussion of this case of Dr. Fowler's several points of interest were raised: (1) concerning the character of the meningitis, whether or not it was of otitic origin, no organism having been found.

Dr. Wendell Phillips said, considering the salient features as stated by Dr. Fowler, he did not think it had been made quite clear that this was a case of meningitis of otitic origin.

Dr. P. D. Kerrison called attention to the observations made by Dr. Neal and Dr. DuBois, that it is quite possible for a meningitis coincident with an otitic lesion to be of the epidemic or meningococcic type and that in such cases as this, where the organism was not discovered, they advocated the early use of antimeningococcic serum.

Dr. J. W. Dwyer said he wished to emphasize several features of importance. This case was one of otitis meningitis through the labyrinth, and the important thing was that a complete labyrinthectomy was not done as is usually done in such cases. This case would not, in his opinion, be a guide for other cases, but it was well to place it on record, as undoubtedly the conservative operative measures here contributed to the happy outcome. The idea at the time of operation was not that of doing a labyrinthectomy but to get drainage, and when Dr. Fowler found the open semicircular canal, with the semipurulent fluid coming out, on being appealed to by Dr. Fowler, he advised no further opening of the labyrinth, as sufficient drainage was apparently established. He wished to say, further, that usually we assumed that we knew all about the labyrinth, that there was a set rule by which we ought to operate on every case, regardless of the findings. This idea the speaker wished to get away from. Our knowledge of the labyrinth is comparatively recent, and all such cases as the case in question should be placed on record.

Dr. Dwyer, in answer to Dr. Kerrison, thought the latter had misinterpreted the results of Drs. DuBois and Neal. The demonstration of the organism in spinal fluid is not always possible, even when present in large numbers, on account of certain well recognized mechanic and biologic facts pertaining to organisms in a closed cavity in contact with such a body as the cerebrospinal fluid. This was well recognized in practice by bacteriologists or serologists for the last few years.

Dr. Fowler, in answer to Dr. Berens' question concerning the character of the fluid that escaped from the vestibule, said that it was noticeably abnormal, turbid or seropurulent, but not markedly purulent.

Dr. T. P. Berens suggested that the inflammation in the labyrinth might have been confined to the region of the disclosed semicircular canal and the meningitis developed through connections other than through the labyrinth itself.

Dr. I. Friesner recalled a case operated upon in which the disease was limited to the external semicircuar canal and hearing present. (2) Owing to the child's condition, no complete functional tests could be made, and the point whether a diffuse labyrinthitis was present was brought up.

Dr. Fowler stated that at the time of operation he thought the labyrinth had been destroyed by the previous attack of vestibular disturbance and that the hearing that existed afterwards was a surprise to him.

Dr. Rae raised the point as to whether there ever had been in this case a diffuse involvement of the labyrinth. It was unfortunate, although unavoidable, that the condition of the patient on admission did not admit of an examination of the hearing. So far as the history goes, the symptoms preceding admission are distinctly referable to the vestibular apparatus, and it is not uncommon to find these in a case of chronic purulent otitis media. The partial restoration of hearing following recovery would make the conclusion almost inevitable that diffuse labyrinthitis had not previously existed, or that if it had, it must have been serous only in character. (3) Whether the limite doperative interference performed in this case was justified and should be considered as a guide for future operations was a question which gave rise to considerable discussion.

Drs. Phillips, Dwyer and Fowler were of the opinion that sufficient drainage was established through the opening at the ampulla and that further interference with the rest of the labyrinth would have increased the risk and made recovery less probable. In opposition to this view Dr. Kerrison recalled a case in which he had found a diseased condition apparently limited to the external semicircular canal, but on uncapping the promontory as an additional prcaution for drainage, he found pus beneath it which would have been confined in a dangerous locality had he been satisfied with the removal of the canal alone.

Dr. A. B. Duel said that in a case of meningitis in which disease of the external semicircular canal was found, as in the present case, he did not think it advisable to stop with the removal of that canal alone, and that under such circumstances the possibility of there being hearing present was not to be considered.

Dr. Thos. J. Harris agreed with Dr. Duel and thought it should go on record that in this case of meningitis in which such extensive disease of the semicircular canal was found, the proper procedure would have been to establish drainage through a more complete exenteration of the labyrinth, that the possibility of saving the function of the labyrinth should not be considered when the life of the patient depended upon the greatest possible drainage through a more radical operation.

Dr. Fowler concluded by saying that he agreed with the principles stated by Dr. Harris, but in the case under consideration he felt he had established sufficient drainage, and in this opinion he was supported by Dr. Dwyer, who was present at the operation and by the fact that the patient got well.

Deafness Following Injury.

Dr. Thos. J. Harris then presented a patient, a girl, 11 years old, the history briefly being that she attended the public school near home as a normal child in every respect so far as her hearing was concerned, up to a certain day last June. Last June she went to school and because of some displeasure on the part of the teacher she was taken to task and shaken, but there was no amount of force used. However, with the little shaking that the teacher gave her, her head struck the blackboard and she went back to the desk. There was no bruise or fright, but she arrived home to her mother and brother in a deafened condition. She has been in the same condition ever since. The history apart from this is that there was no deafness in the family. The older brother never had any ear trouble. The child gave no indication of deafness, nor is there any indication of nystagmus, vertigo or noise in the ear. The child was taken to the Manhattan Hospital some time during the early fall—in September—and was seen by some of the men on Dr. Phillips' staff, and there a Wassermann was taken. The report for the Wassermann was negaitve. The child is extremely intelligent but rather nervous. The nose and throat are normal. With Barany noise produced in the right ear she is totally deaf in the left ear. There is, however, some hearing in the right ear. No eamination has been made of her eyes. Dr. Harris stated that he had questioned the mother and brother, also Miss Gregory, who is one of the representatives from the public schools. He said that she could read lips if she were not so nervous. The interesting question is, what has taken place in this case—a double hemorrhage, or is this one of those cases of a psychical nature? It seems incredible that this slight traumatism should have produced this result. There is a straight history from the mother and no history of sickness. The child was perfectly well with it all and went to school, but has no hearing in the left ear and very little in the right one. Dr. Harris stated that this little girl had been sent to the Wright School and that Miss Gregory would be glad to supplement any information on the history.

DISCUSSION.

Dr. Scruton suggested that it would be interesting if the child were made to speak, in order to hear the tone of her voice; that her degree of deafness might be judged somewhat from the tone of her voice. The teacher who was with the little girl got her to answer a few questions, and it was noticed by several members present that the child answered these questions when her eyes were directed away from the teacher, so that, in their opinion, the child hard the sound of her voice and did not read her lips.

Dr. Rae ventured the suggestion that the hysterical element should be considered in this case and that the Lombard test might be of great value.

In all these cases three elements were of importance: (1) an unstable nervous make-up; (2) the immediate suggestion of impairment of the hearing, sometimes real. This constitutes "auto suggestion"; (3) the added suggestion of continued impairment of hearing by the line of treatment and by association with those really deaf. This is the socalled "heterosuggestion."

The absolute diagnosis should be made as soon as possible. Should the case prove to be hysterical, it is quite likely that the patient will fare better by the cooperating of the otologist with the psychiatrist.

Dr. Rae showed a

Specimen of an Internal Jugular Vein

from a neglected case of sinus thrombosis, presenting several metastatic joints at the time of operation. The vein wall above the junction of the facial was completely eroded and the upper end was lying free in an abscess cavity. A small clot in the upper end was all that prevented hemorrhage into this abscess cavity. The facial vein was very much enlarged and carried blood.

Dr. A. B. Duel reported a case of

Mastoiditis Following Measles

on which he had operated, which ran a high temperature, a high leucocyte count, a high polynuclear percentage and a positive blood culture of streptococcus hemolyticus, which gradually subsided and was apparently going on to uneventful recovery without any further operative intervention, it being then two weeks after the operation.

Dec. 29, 1919. Temperature, 103 to 104½. Measles.

Dec. 31. Myringotomy; left ear culture and smear taken.

Report: Pus and superficial epithelial cells with no apparent bacteria. Free drainage from left ear. Temperature ranging from 103 to 101.

Jan. 2, 1920. Temperature dropped to 100.

Jan. 4. Myringotomy, right ar. Swab culture and smear taken.

Report: Culture showed a growth of a streptococcus which developed no pigment or hemolysis and a staphylococcus aureus and nonpathogenic organisms.

No rise in temperature until Jan. 7, 1920. Temperature, 103, 102.

Blood count, Jan. 9, 1920, W. B. C., 12,000; P. 74.5 per cent.

Blood count, Jan. 10, W. B. C., 10,200; P., 75.0 per cent.

Blood count, Jan. 11, W. B. C., 10,500; P., 74.5 per cent.

Blood count, Jan. 12, W. B. C., 12,900; P., 67.0 per cent; L., 33.

Jan. 12. Operation right mastoid. Culture taken at operation.

Report: Culture showed a growth of a streptococcus which developed no pigment or hemolysis and nonpathogenic organisms.

Postoperative temperature, midnight, Jan. 13, 99; 2 a. m., 98.6; 9 a. m., 104.8; 12 noon, 101.8; 4 p. m., 103.8.

Blood count and culture taken. White blood count, 36,500; P., 91. Culture hemolytic streuptococci, 1 flask.

Jan. 14. Temperature not over 102 and after that a gradual drop.

Jan. 14. White blood count, 29,600; P., 91; L., 9, at 9 a. m.; white blood count, 25,400; P., 88; L., 11.5, at 6 p. m.

Jan. 15. White blood count, 17,600; P., 88; L., 10. Blood culture negative.

Jan. 16. White blood count 9,400; P., 73; L., 27.

Dr. Dwyer thought that in this case Dr. Duel had the beginning of a lateral sinus thrombosis in which there was a tremendous outpouring of leucocytes to combat the localized inflammation of the sinus, but that if it later became walled off it might remain permanently walled off and become organized, or it might later on disintegrate and cause trouble.

Dr. Duel replied that he had understood from Dr. Dwyer that cases of sinus thrombosis rarely ran such a high leucocyte count; that with this leucocyte count a beginning pneumonia or meningitis might rather be expected.

Reference was then made by Dr. Dwyer and Dr. Scruton to the routine practice of taking blood cultures before and after mastoid operations, as carried out some years ago at the Manhattan Hospital after similar investigations had been performed at Mt. Sinai and to the difference in the conclusions reached by Dr. Libman of Mt. Sinai, who maintained that a positive blood culture in such cases invariably meant a sinus thrombosis, and Dr. Duel and Dr. Wright of the Manhattan, who found, on the contrary, that a considerable percentage of such cases had positive blood cultures without ever developing sinus thrombosis.

Dr. P. D. Kerrison reported a rapidly fatal case of

Cerebellar Abscess,

apparently complicating acute mastoiditis. The patient, a girl of 14 years, was admitted to the ear ward of the Manhattan Eye and Ear Hospital, November 8, 1919. The history obtained from herself and family was of an acute purulent otitis media of the right ear of ten days' or two weeks' duration. On the day of admission, November 8th, the drum membrane was intact but somewhat red and infiltrated. Appearance of drum membrane is described as suggesting an acute lesion which was undergoing resolution. Temperature was 98.4. No pain or tenderness. Mind perfectly clear. X-ray ordered.

On November 10th (time of Dr. Kerrison's first examination). Drum membrane had been incised the day before. Temperature, 98.6; pulse, 63. At this time the following symptoms were present: Nystagmus, changing in direction, but most active to right when eyes were turned in that direction; incoordination ataxia of right hand; diadokokinesis with slow movements of right hand. Past pointing to right with right hand; left hand retaining normal pointing accuracy. On standing with eyes closed there was a clear and constant tendency to fall to the right. Eye grounds normal. X-ray showed cloudiness in region of right antrum.

A diagnosis of cerebellar lesion was made, but on account of the very recent onset, only a mastoidectomy was done at this time. The mastoid was of diploic type, with evidences of only moderately extensive disease.

During the days following the operation the focal symptoms of cerebellar abscess were so definite as to make the diagnosis practically positive. These symptoms were good hearing in both ears; nystagmus to right; falling to right; past pointing of right hand to right, left pointing normally; incoordination ataxia; diadokokinesis (right). Reflexes normal but less active on right side. During these days, but for these focal symptoms, the patient's general condition was better—i. e., she complained only occasionally of moderate headache; her mentality was perfectly clear; and what is exceedingly unusual in such cases she did not seem to suffer particularly from insomnia even at night.

Owing to her history of a very recent onset and her very favorable general condition, it was decided to wait until the following Monday, one week from the day of the mastoid operation, to explore the cerebellum. It was thought the additional time would increase the chances of finding the abscess without undue multiplication of incisions. This was a decision which, Dr. Kerrison said, he thought of now with very great regret, for the patient died unexpectedly on Friday night.

An autopsy was refused, but Dr. Kerrison took occasion to remove a little bone behind the sinus, where introduction of a knife revealed the presence of an abscess.

NEW YORK OTOLOGICAL SOCIETY.

Meeting of March 23, 1920.

Paralysis of the External Rectus Following a Thrombosis of the Sinus at the Bulb.

Dr. John R. Page: I reported a case of paralysis of the external rectus following a thrombosis of the sinus at the bulb. The wall of the sigmoid area was thin and normal in appearance. The woman had a leucopenia and it was thought possible that she had typhoid. After waiting several days it was decided to explore the sinus, to determine the cause of the high temperature and septic appearance. When this was done there was little or no bleeding from below. The jugular was then excised and the temperature subsided. The day after the operation a paralysis of the external rectus appeared and a metastastes in the wrist. She went on to uneventful recovery and the metastases cleared up. I considered the paralysis of the external rectus to be due to the close relation of the sixth nerve to the inferior petrosal sinus. A similar case was seen in a young man who, after a mastoid operation, ran a temperature of 103 or 104 and developed a paralysis of the external rectus on the side of the operation, about a week later. This occurred shortly after the case just mentioned, and I felt that the paralysis might be significant of trouble in the jugular bulb and as the temperature remained between 103 and 104, though without any typical remissions, I decided to explore the sinus. In doing so I found no bleeding from below, so the jugular was resected with a satisfactory result.

Dr. Bowers: When the paralysis appeared I explored all parts. I exposed the sinus to a point behind the knee, but the sinus was normal in appearance. I apparently could plug it off at both ends. There seemed to be blood coming from below. The temperature was never above 102. The patient did not appear very sick and had no headache. I exposed the dura in the middle and posterior fossa and found them normal.

Dr. Page: In both of my cases the sinus had the appearance of a normal vein. The wall was not inflamed in the mastoid region. While there was a flow of blood from below, there was not the usual gush present.

Dr. J. G. Dwyer: About seven years ago I wrote about three causes of external rectus paralysis: (1) Basilar meningitis; (2) simple mastoid—most of them have relation to the petrosal sinus of the sixth nerve; (3) intraspinal syphilis.

Dr. F. B. Dench: I operated upon a young girl on the fifth day of an acute mastoiditis of the hemorrhagic type; the wound suppurated, broke down and refused to heal. Five weeks after operation there was an external rectus paralysis and severe headache over the area of the trigeminal nerve. I thought it might probably be hysterical. A neurologic examination showed paralysis of the sixth nerve with nothing to account for the pain. I thought we had adhesions about the Gasserian ganglion and explored the apex of the petrous pyramid, stripping the dura about the Gasserian ganglion. The patient made a perfect recovery. I believe that there were adhesions involving the Gasserian ganglion which accounted for the pain.

Dr. Kerrison: I have operated upon only one case of abducens paralysis. I looked up the literature at the time and found many cases reported in which a sixth nerve paralysis complicating mastoiditis quickly disappeared after mastoidectomy. My case was that of a girl of eight years, who was under Dr. Jno. M. Wheeler's care for her eye condition. Her chief discomfort was diplopia. She suffered from a right sided mastoiditis, and trying to rotate her eyes to the right—e. g., to follow one's finger moved to the right—the left eye moved normally in that direction, the right eye stopping in the median position.

The operation was a simple mastoidectomy except that the sigmoid sinus, the dura covering the cerebellum in front of the sinus, and the dura over the tegmen antri were uncovered, but no evidence of disease was found in these regions.

On the day following the operation the function of the right rectus was much improved. On the second day, Dr. Harmon Smith, who was interested in the case, examined the patient with me, and we could find no sign of paralysis.

In the literature there are many reports of quick recoveries after operation. There are also many theories as to the method of nerve involvement—e. g., through necrosis of the apex petrous bone (Gradenigo); pressure on nerve during cavernous sinus thrombosis; spread of infection along the floor of the midcranial fossa; direct infection through suppurative labyrinthitis. These various hypotheses, while theoretically sound, do not aid us much in dealing with a given case. We do know, however, that many cases of sixth nerve paralysis complicating mastoiditis have recovered more or less promptly after careful mastoidectomy.

Dr. Harris: I saw a case which developed a very pronounced paralysis after operation. It was relieved by an ordinary sinus thrombosis operation. We never recognized any bulb condition. There was no rise and fall of temperature. What significance are we going to attach to paralysis after mastoid operation?

Dr. Kerrison: There may be three causes: (1) Meningitis over the tegmen; (2) Gradenigo's symptom, or paralysis due to inflammation involving the petrous bone; (3) paralysis secondary to sinus thrombosis.

Dr. E. B. Dench: It seems to me that when we consider the anatomy of the sixth nerve it is more or less exposed in cranial cavity, therefore any inflammation in the cranial cavity may involve the nerve.

Dr. Haskin: Does the sixth nerve pass out of the posterior lacerated foramen?

Dr. Dench: No; from the anterior lacerated foramen, and hence any inflammation of the cerebral membranes from the posterior lacerated foramen to the anterior lacerated foramen may interfere with the function of this nerve.

Dr. Duell: A perineuritis comes into very close proximity with the inflammatory condition.

Dr. Bowers (closing): I did not make a diagnosis of encephalitis. The neurologist made that. I said that if the paralysis had occurred on the other side I would have believed him. There were no other indications for operative interference that I could see.

Three Unusual Cases

Dr. J. D. Dwyer: : I performed a simple mastoid operation on a woman in February, and after the operation she ran a perfectly normal temperature until the eighth day, when there was a sudden rise to 106°, which kept up for four days. The first blood count was 17,000 with 78 per cent polys, leucocytes 56, then 96 per cent polys. It was negative for meningitis. The temperature fell on the fourth day, but even with normal temperature the blood count was 45,000. There was a chest condition showing rales. Another case, a woman operated on for mastoid disease, nearly died on the table. Acetone and diacetic acid were present. I found the sinus exposed and the wall eaten through and lying on the sinus wall eight or ten small coagulated blood vessels at the knee. I tied off the jugular and the patient made an uneventful recovery. An hour after the operation there was no acetone. Of course, this was a heroic measure. The third case was a woman. The history showed that when she was in bathing she felt a sudden pain in the ear. Later there was a little discharge from the ear. She consulted her doctor. He said there was a little wet wax. The smell indicated bone disease. There was a small bleb with granulation tissue and a fistula in the posterior wall, two or three mm. from the drum. The middle ear was perfectly normal; labyrinth was normal; Weber normal. The fistula is under the facial nerve. The question is whether to do a mastoid operation.

Dr. Haskin: In the second case the woman had irritation of the third nerve.

Dr. Rae: This raises up the question of cholesteatoma.

Dr. Dench: There is no question at all but that a cholesteatoma should be operated upon.

Dr. Friesner: The question in this case was whether there should be a radical mastoid or not.

Dr. Haskin: Was there involvement of the facial nerve, about 2 mm. from the drum, near the floor, not near the attic?

Dr. Berens: Should one leave a cholesteatoma in? No; one could keep away from the nerve, or even by dissecting out the nerve one would not necessarily get a paralysis.

Dr. Scruton: I would like to ask Dr. Dwyer what the X-ray indicated? Did it show that there was cholesteatoma present? I don't know how one would diagnose a case of cholesteatoma by the X-ray. I have seen a few cases of that type. These cases seem to be a low grade condition, lying dormant for a long time and not recognized. The diagnosis is furunculosis. That teatlike formation is not a furuncle. One should do a simple mastoidectomy and be guided by the findings.

Dr. Dench: Dr. Richards operated on an acute case where the functional tests were normal and hearing perfect. The man had

had two operations. If there is a cholesteatoma in the middle ear the mastoid and middle ear may be thrown into one cavity and a complete mastoid performed, taking out the ossicles. A cholesteatoma does not clear up after a simple mastoid. Any modification of the mastoid might sometimes be successful, sometimes not. The external auditory canal and the meatus must be joined together. I do not think the normal hearing tests mean much. I think unless a radical mastoid is performed for cholesteatoma, recurrence is likely.

Dr. Haskin: Has Dr. Dench had any experience in determining cholesteatoma by the X-ray? The X-ray is often not very satisfactory in mastoid work. I have had cases of chronic suppurative ears on one side X-rayed, and have had the report come back that both mastoids were full of pus and granulations, where there was no history of both, but the X-ray man reported both mastoids involved. One is not justified in accepting this diagnosis. In one man, 22 years old, who said he had had discharge on the other side in childhood, the drum and membrane showed old traces, but he said he had never had any trouble since childhood.

Dr. Lewis: I don't think you can read pus and granulations in the X-ray.

Dr. Dench: I did not understand Dr. Haskin's question. In children you do not find infantile type of bone, and also in chronic suppuration. I always see every case X-rayed. I don't remember a single case where I have recognized a cholesteatoma. The infantile type of bone is common in the marked suppuration cases. I have done double operation with infantile bone on one side and sclerotic bone on the other, but that is atypical.

Dr. Scruton: Reading the X-ray is a matter of comparison. Some send in histories to the X-ray man and additional data. Some do not give him any data. The X-ray man should get a concise history and be told what the operative findings are. There should be co-operation in working out the X-ray findings.

Dr. Dench: I should like to take exception to that particular statement.

Dr. Bowers: In one case I had of chronic ear the whole mastoid was full of cholesteatoma. The X-ray showed nothing more than a sclerosed mastoid.

Dr. Friesner: In a cholesteatoma taken from a large cavity the X-ray findings showed the findings distinctly. There was a very thin cortex, just like eggshell. I would like to go back to Dr. Dwyer's case. In the operative treatment of these cases we begged the question. Supposing there was tympanic perforation, the paralysis would be an extension of middle ear condition from the mastoid.

Intracranial Growth.

Dr. Harris: This patient has been under observation seven years. He was presented three years ago. It is a case of intracranial growth. He is an Episcopalian minister, who developed ear symptoms at the age of 20 years, while in the theologic seminary. At first we thought it was a case of middle ear suppuration. In 1913, at St. Luke's Hospital, based upon symptoms pointing to mastoid involvement, we operated but found nothing in the matsoid. The growth remained away for a short time. The pathologic report at that time was lost, but pointed to sarcoma. Paralysis of the left recurrent laryngeal nerve followed, then involvement of the facial with partial lid drop. The labyrinth was dead with loss of hearing. Further operation was decided against, but radium therapy was instituted. He had several applications of radium with remarkable benefit. Then he developed symptoms of irritation of some of the cranial and spinal nerves by extension of the growth. Two years ago he suffered most severe and almost intolerable pain. This disappeared later. I saw the man two years later. I expected him to die, but he recovered and has been able to do his full complement of work. He now feels better, and examination of the ear and canal showed recession of the growth, which at one time protruded a little from the auditory canal. Dr. Ramsay Hunt has recently made a careful neurologic examination. He concludes that the growth seemed to have made little progress and that the man was in excellent condition. A blood Wassermann was negative.

Dr. Dench: Was there any reaction of the eighth nerve?

Dr. Harris: None.

Dr. Saunders: What about the spinal fluid Wassermann? Was that negative?

Dr. Dench: It would seem advisable to make a Wassermann test of the cerebrospinal fluid and to try salvarsan.

Mastoid Disease Determined by Radiogram.

Dr. Macpherson: I hesitated before deciding to report this case, as, apart from one or two features, it is commonplace, but in view of the remarks relative to radiographic plate values, the case and the accompanying plates may be interesting.

I first saw the case on February 22nd, when he stated that he was suffering from right frontal headache, which had been present for a week. His nose had been operated upon on January 26th, following which he had pain in both ears. He was treated by inflation, but not improved. He had right sided nasal discharge for a week following January 26th. No abnormal discharge was found on or after February 22nd, but right frontal headache was intense and prevented sleep.

Examination shows right drum to be pearly pink, and slightly bulging outward. On touching with cotton or a probe, it rustles like paper. An X-ray picture, taken ten days ago at the Eye and Ear Infirmary, was negative. There was no evidence of accessory sinus disease found March 1st. Temperature taken t. i. d. from the 24th of February to the time of operation showed no rise above normal.

Radiographic finding show absence of both frontal sinuses, and the other accessory nasal sinuses appear to be normal. Hence, the frontals are positively excluded as a cause of the persistent headache.

The right mastoid was reported as filled by granulations or pus with evidence of beginning softening.

Operation was advised, but the pain suddenly disappeared, and the patient and friends hesitated until, on March 13th, the patient experiencing a mild attack of vertigo, we were permitted to operate upon the mastoid on the 14th. The mastoid cells were pretty thoroughly destroyed, and a perisinus abscess was present. The knee of the sinus was pitted, and it was felt that there was a likelihood of partial collapse from a thrombus. However, it was decided to await developments before exploring the sinus. The aditus ad antrum was very small and contained granulations, which may have played a part, together with granulations in the middle ear, in causing the drum to present the appearance described.

The patient recovered without any later sinus symptoms. The interesting features were the frontal pain with the history of early nasal discharge, which caused some confusion until the radiograph was taken; the cause of the frontal pain; absence of a rise of temperature for the period of three weeks; absence of pain on deep pressure during the period of a month; the evidence of middle ear involvement, peculiarly indicated by the appearance of the drum; the aid given by the radiograph.

Dr. Haskin: Did you say there was profuse discharge from the nose? Was there a lumbar puncture done?

Dr. Macpherson: Yes, the discharge was profuse for a week following the nasal operation. There was no lumbar puncture made.

Dr. Friesner: Was there any rise of temperature?

Dr. Macpherson: No.

Dr. Haskin: Was there any tuberculous history?

Dr. Macpherson: I think there was, but am not positive.

Dr. Haskin: Did you try the tuberculin test?

Dr. Macpherson: No, the boy was 18 years old, and the case acute.

Dr. Haskin: In spite of that, you often get valuable information from the tuberculin test, even in grown people.

Streptococcus Capsulatus Mastoid Involvement.

Dr. Saunders: This is a case of streptococcus capsulatus mastoid involvement in a man of 70 years. Seventy years later he was operated upon on the other ide and the same organism was isolated from the mastoid pus. I would like to know if anyone else here has had a mastoid in a patient of this age.

Dr. Dench: I have had a patient of 70.

Dr. Lewis: I had one patient of 74; this was a capsulatus case.

Dislocation of the Stapes.

Dr. Dench: Reported a case in which during the radical operation the stapes was dislocated. No untoward symptoms followed except that, of course, the patient was totally deaf upon that side. Secondary grafting gave the patient a dry ear. As there was suppuration upon the opposite side, the patient was told that a similar accident might occur upon this side if operation were undertaken. The patient decided to take the risk, and a radical operation was performed upon the second ear, the primary graft being employed. The patient made a perfect recovery with improved hearing. The case was cited in answer to a report made by Dr. Richards at a previous meeting, at which time he (Dr. Richards) advised immediate vestibular drainage in cases of accidental dislocation of the stapes. Dr. Dench's case proves that this is not necessary. Dr. Dench also mentioned other cases where the stapes had been dislocated without any meningeal infection.

Dr. Rae: We discussed this before at the otological society. I think dislocation of the stapes was common when doing ossiculectomy. Nobody realizes the danger of infection of the labyrinth. The stapes can be removed without fatal results.

Unusual Color of Tympanic Membrane.

Dr. D. P. Kerrison mentioned the case of an old lady who had been under his care for several years, the interesting point in whose case was the color of her right drum membrane—i. e., that of a good specimen of green jade. This color has not changed since he first saw the patient. Otherwise the drum membrane was fairly normal, or at least showed all the normal landmarks.

Dr. Dench: Was there any fluid in the middle ear?

Dr. Haskin: I saw a patient in Dr. Rae's clinic. There was chronic suppuration on one side. The other side the membrane was intact. It was dark blue. There was no fluid. It never changed in color.

Dr. Page: I have seen one such case in which the drum was a dark brown color. Argyrol had been used through a catheter. I incised the drum and it regained its normal color.

Metastatic Orchitis Following Removal of Ear Polyp.

Dr. McCullagh: In the case referred to, I do not know whether the symptoms were coincidental or secondary. The patient, a man, 65 years old, had a polyp in the middle ear. I removed a piece and the next day he had a metastatic orchitis. This condition came on 24 hours after removal of the polyp. Two weeks later the man developed labyrinthitis of the serous type. This was relieved by a radical mastoid operation.

Dr. Dench: I have seen a sinus thrombosis develop after such a procedure. The metastases might be in any part of the body. Was it a secondary mumps case?

Dr. McCullagh: No. There was no parotitis.

Psychic Deafness.

Dr. Harris: I would like to mention the case of a little girl presented at the last meeting. I made a tentative diagnosis of psychic deafness. We were contemplating lip reading instruction. She was sent to a neurologist. In the course of examination Dr. Hunt made the child talk and she heard and answered questions. This cleared up the diagnosis.

Granulation of the Auditory Canal.

Dr. Scruton: The case I mention was of a young man, a member of the Society for the Improvement of the Deaf. He was a K. of C. man. He had been deaf since childhood. After return from the army (where he was operated upon by an army surgeon) he heard normal spoken voice without difficulty until after operation for removal of a polypoid granulation in the canal. When he came to me the granulation material had increased in size. After adrenalin and cocain were put in he could hear, but became deaf again. I thought of the Hopkins operation of widening the canal. I found that the granulations came from the anterior inferior quadrant. I put a curette into the middle ear without disturbing the ossicles to remove granulation. The boy cannot hear now, and the only thing to offer is a radical operation. Before the granulation was removed he could hear well. I believe I am justified in doing a radical.

Dr. Rae: Did he fail to hear after the operation? What does the functional test show now?

Dr. Scruton: He does not hear anything unless transmitted by bone. The Weber is not lateralized. I did not try the Galton. There is a considerable amount of moisture in the ear. The drum looks rather thick and beefy. I presume the manipulation created inflammation. The point is what operation should be advised. Is a radical safe?

Dr. Harris: When was the operation done?

Dr. Scruton: Within the last five weeks.

Dr. Bacon: Was there any odor to the discharge?

Dr. Scruton: No. I opened the mastoid and it was normal. The condition was confined to the middle ear.

Dr. Bacon: Is the conduction good on the other side?

Dr. Scruton: Yes.

Dr. Lewis: I would be inclined to wait awhile.

Dr. Harris: I should, too.

Dr. Duell: Has he bone conduction on both sides?

Dr. Scruton: Yes. That is apparently perfect. That is why I hope for results from a radical. The other ear was similar to this, but it has been dry for five years. I removed a polyp in that ear. I think the boy needs a radical.

Dr. Duell: Can the boy hear in an artificial tube?

Dr. Scruton: No. I may have stirred up these bones in some way or other.

Dr. Duell: I think it would be a good plan to let it alone.

Dr. Page: It seems to me that if the hearing is as bad as that, there must be something further in to get such deafness.

Dr. Kerrison referred to the case of a young woman he had seen in the wards of the Manhattan Eye and Ear Hospital. The left drum membrane was red and markedly bulging. The patient, however, showed the cardinal symptoms of a suppurative labyrinthitis, viz.: she was intensely dizzy; there was strong spontaneous nystagmus to the right; using a noise apparatus in the right ear, she was apparently absolutely deaf.

Acting on the physical signs of inflammation in the left drum membrane, this was incised, giving exit to pus apparently under pressure. This almost immediately was followed by relief of symptoms—i. e., hearing returned, and vertigo and nystagmus disappeared. This case, for which, he said, he could give no exact explanation, shows at least this fact: That we may have a condition within the middle ear in which the pressure of confined fluid will so act on the labyrinth as to cut off both the cochlear function and also that of the vestibular mechanism.

Dr. Scruton: I know of a case in which the man had been deaf from childhood up and had a discharging ear for a number of years. He had been to all the prominent otologists. Finally he went to one in Paris. He wrote to Paris to find out what had been done. One of the assistants of this doctor wrote back that the boy had been given almost perfect hearing by doing what he called "mobilization of the stapes." There may be something in that, but I have had no experience with it.

Dr. Kerrison: I never saw any permanent results from it. When adhesions form, the hearing is often worse.

Dr. Dench: We are talking about two different conditions: One suppurative, one serous. Serous fluid in the tympanic cavity will cause absolute deafness. It is not necessary to incise the drum membrane. Inflation will cause marvelous improvement.

Some patients have nystagmus during inflation. If you have fluid in the posterior portion of the tympanic cavity, changing the position of the fluid by moving the head will affect the hearing. This has been seen in a number of cases. In regard to mobilizing the stapes, I do not think there is much to that procedure except in cases after radical operation. With a vaseline pledget placed over the head of the stapes you can sometimes get improvement in hearing which is marvelous. I have seen hearing for the whisper increase from four feet before the insertion of the pledget to twenty feet after its use.

Dr. Garrison: I have seen serous otitis, but these cases are labyrinthitis.

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LOCAL AMYLOID WITH SPECIAL REFERENCE TO SOCALLED AMYLOID TUMORS OF THE TONGUE.*

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MINNEAPOLIS.

Amyloidosis, or generalized amyloid deposits, usually appearing in the liver, spleen and kidneys and also in other tissues, are well recognized in medical literature. Although now found in a markedly lessened number of cases as compared with the days before early and rational surgery became a custom, the condition is by no means a rare one.

The ease with which amyloid in these cases may be recognized, both macroscopically and microscopically, its specific physical and chemical properties and its almost constant "locus" in the subendothelial spaces of blood sinuses and capillaries and in the walls of medium sized and small arteries, all together present such a classical picture that, aside from questions in regard to pathogenesis, little remains to be added to our knowledge on this subject.

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Local amyloid deposits, on the other hand, are so infrequently recognized or described, and present so many modifications from the lesions seen in general amyloidosis that the study and report of instances of their occurrence are still fully justified.

LOCAL AMYLOID OF THE EYELIDS AND RELATED STRUCTURES.

Some of the earliest references to local amyloid disease are found in the ophthalmologic journals and deal with amyloid deposits in the conjunctiva, cornea, and other structures of the eye. The first reported studies of this condition seem to have originated from the University of Dorpat (now Yuryev), which was the center of a population heavily infected with trachoma. Not all of the literature has been found available, but the references which could be consulted were fairly representative, and the cases which are abstracted below reveal most of the noteworthy features presented by amyloid changes in the lids, cornea and scleræ. The cases are arranged chronologically:

1. Kubly. Adenomatous growth in conjunctiva of left lid with hyaline changes. Hyaline also seen in right lower lid and amyloid in conjunctiva of right upper lid.

2. Beselin. Masses of amyloid in superficial layers of cornea.

3. V. Oettingen. Male, age 51. Tumorlike thickening of left lower lid showing amyloid. Left upper lid and both lids of right eye showing trachoma.

4. V. Oettingen. Female, age 22. Right and left upper lids thickened and amyloid affecting smaller vessel walls identified.

5. Kyber. Adult. Tumor removed from inner angle of eyelids, diagnosed clinically as squamous cell carcinoma. Microscopically no epithelial cells found, only necrosis and amyloid degeneration of small vessels.

6. Saemisch. Male, age 33. Swelling of left lower lid. Trachoma of left upper and both right lids. Disease had lasted two years, following a cold. Operation on left lower lid

only. Chronic perichondritis of cartilage with amyloid changes in the affected cartilage.

7. Saemisch. Male, age 45. Findings similar to above in right eye. Both patients otherwise well.

8. v. Becker. Tumorlike thickening on tarsal portion of lower lid with amyloid deposits. Trachoma of upper lid.

9. Reymond. Amyloid tumor size of almond in scleral tissues of one eye only. No involvement of lids.

10. v. Hippel. Male, age 29. Swelling for two and a half years affecting both lids of right eye near outer angle and also left upper lid. Masses removed from all three lids and showed amyloid in clumps and also involving vessels, with foci of calcification and ossification. Regarded amyloid as a regressive metamorphosis of tissues of lids probably accompanying trachoma.

11. Leber. Male, age 22. Swelling of left upper lid for six years following operation for ptosis of lid. Other upper lid also thickened. Involvement of scleral tissues in both eyes. Patient otherwise well. Clinical diagnosis trachoma, but pieces removed showed amyloid of blood vessels and apparently in lymph channels. Thinks v. Oettingen's cases probably trachomatous, but doubts this diagnosis in his and Saemisch's cases. Regards amyloid as a degeneration following a new formation and sclerosis of connective tissue. Found cell structures suggesting giant cells.

12. Leber. Male, age 21. High grade diffuse trachoma and amyloid thickening of left upper lid. Piece removed revealed amyloid of blood vessels and in concretions. Giant cells present.

13. Leber. Saw similar findings in another old case of trachoma with very thickened lid.

14. Zwingmann. Reports a recurrence two years following operation. Regards amyloid as a regressive metamorphosis in diffuse or circumscribed granulomata, a sort of trachomatous overgrowth.

15. Narkiwicz. Found amyloid in conjunctiva near to a tumor of lid, a rhabdomyoma striocellulare, that also showed amyloid deposits.

16. Mandelstamn and Rogowitsch. Female, age 52. Both lids and scleræ around cornea of right eye thickened and

showed amyloid in walls of vessels and in lymph channels. Giant cells present. Trachoma in lids of left eye.

17. Bachelmann. Hyaline degeneration of conjunctival tissues with circumscribed amyloid deposits. Regarded the amyloid as secondary to the hyaline changes.

18. Raehlmann. Female, age 19. Bean sized amyloid tumor of upper lid. No reaction around it. No giant cells and no other evidence of disease. Believed amyloid followed hyaline changes.

19. Vossius. Male, age 35. Tumor showing amyloid in right upper lid of two years' duration. Measured 30 mm. long, 12 mm. in breadth and 6 mm. in thickest portion. Vessels involved and also found a tiny focus of ossification. Giant cells present. No evidence of hyaline.

20. Vossius. Female, age 19. Amyloid tumor of right upper lid, 22 mm. in length, 9 mm. in breath and 4 mm. in thickest portion. Amyloid resembled preceding case and in addition involved basement membrane of Krause's glands. Foci of calcification.

21. Krüdener. Collected six cases from Dorpat and two from Petrograd of amyloid tumors of eyelids. Vessels always involved. Thought amyloid followed hyaline changes.

22. v. Hippel. Enucleation of eyeball following traumatic cataract and iridocyclitis with leukoma adhaerens. Amyloid present in anterior layers of thickened cornea.

23. v. Hippel. Irregular thickening of cornea with clumps of amyloid in affected portions. Believes amyloid in both cases was derived from red blood cells.

24. v. Hippel. Male, 24. Cloudy cornea of left eye with blindness. Amyloid masses in thickened cornea.

25. Naito. Male, age 37. Left eye enucleated because of blindness following inflammation in infancy. Amyloid changes in obliterated vessels of retina and in connective tissues posterior to retina with bone formation. Regards the amyloid bodies as corpora amylacea deposited in optic nerve preceding hyaline changes.

26. Schieck. Male, age 19. Tumor of scleral conjunctiva extending from caruncle to limbus with later involvement of lower lid. Excised mass showed amyloid deposits and amy-

loid in vessel walls. Giant cells present; also infiltration of lymphocytes and plasma cells. Various intermediate changes between amyloid and hyaline.

Of 14 of the above cases where sex and age were given, 10 were males and 4 females. The ages ranged from 19 to 52, with the majority (8) of these occurring in persons under 30. In 19 cases the lids were involved and only one of these (No. 14) was a real tumor. The cornea showed changes in four cases and the scleral conjunctiva in three instances. In one (No. 24) the retina and adjacent tissues were attacked. Amyloid was noted in the vessel walls of 11 cases, giant cells in 5, hyaline changes in 5, ossification in 3 and calcification in 2. Two authors concluded that the deposits could be seen in lymph vessels.

While one must admit that in all of the above cases amyloid could not be shown to be absent in other tissues of the body, the conclusion seems nevertheless justified that inflammatory conditions of the lids, cornea, sclera and other portions of the eye may show secondary and strictly local deposits of amyloid.

The question of the relation of these deposits to trachoma has provoked much discussion and contrary opinions. There seems to be little doubt that many cases of trachoma are complicated by amyloid infiltrations, but similarly there are numerous examples of amyloid appearing in or about the structures of the eye without the slightest evidence of any recognizable preceding disease. The extreme grade of chronic inflammation often encountered in severe trachoma, associated with hyaline changes in the dense connective tissue of the tarsal plates, may be reasonably interpreted as one set of favorable or predisposing conditions for the appearance of local amyloid.

This lesion would seem to deserve more attention than it has heretofore received, especially from American and English ophthalmologists.

LOCAL AMYLOID IN THE RESPIRATORY TRACT.

Of all the regions of the body where local deposits of amyloid have been described, those found in the respiratory tract have received perhaps the most careful attention from pathologists and clinicians.

The respiratory tract has long been recognized as being the seat of what we must, from the present state of our knowledge, regard as lesions closely related to amyloid formation. Early and pathologic ossification of the laryngeal cartilages, ossification and calcification of the tracheal and bronchial rings, socalled metastatic deposits of lime salts in the tissues of the lungs, corpora amylacea in the alveoli, and the fairly frequent occurrence of bone and cartilage containing tumors of any portion of the tract, as well as the occurrence of amyloid, are all conditions which may at some future time be found to be associated in whole or in part with similar fundamental alterations in metabolism. The cases which are reviewed below represent the essential data available and are arranged in the chronologic order of their publication:

1. Lesser. Female, age 78. Death from aortic and mitral insufficiency. Large bone and cartilage containing tumor showing amyloid degeneration and measuring 15 by 5.5 by 2.5 cm., in lower lobe of left lung. Near mass other smaller similar nodules. Syphilitic scars in liver. Amyloid also found in spleen.

2. Balser. Male, age 66. Death from slowly increasing stenosis of bronchi due to development of numerous irregular gelatinous and colloid masses on inner surface of both bronchi and trachea, which were changed into hard inelastic tubes. These masses showed cartilage and bone formation with amyloid change. The amyloid also involved blood vessels of the submucosa as well as the basement membranes of the glands.

3. Hooper. Male, age 33. Operative removal from larynx following hoarseness, of a smooth, globular, slightly lobulated, pedunculated tumor 12 mm. in diameter and attached to anterior superior surface of larynx, involving left vocal cord and portion of ventricle. Peduncle short and 3 or 4 mm. in diameter. No recurrence after 10 months. Microscopic diagnosis, telangiectatic myxofibroma with hyaline and extensive amyloid degeneration. Amyloid also seen in blood vessels.

4. Schranck. Female, age 35. Operative removal of cherry sized tumor from anterior wall of larynx. Tumor

showed amyloid with transition stages from hyaline. Recurrence. Syphilis given as etiologic factor.

5. Lubarsch. Female, age 75. Nodules found in lung, composed largely of hyaline connective tissue with some amyloid deposits. Extensive review of relation of hyaline and amyloid degeneration.

6. Burow-Neumann. Male, age 66. Had suffered from dyspnea for 15 years. Seven years before death had two tumors removed from larynx, and from that time up to death from bronchitis lived with cannula in tracheotomy wound. At autopsy three tumors found in larynx obstructing the lumen. These were composed of amyloid masses arranged in concentric layers, with intervening portions of connective tissue. Process regarded as amyloid degeneration of fibromata, inasmuch as the two earlier tumors were called fibromata.

7. v. Schrötter. Female, age 57. Operative removal of tumor from left arytenoid cartilage. Amyloid in walls of tumor arteries. Believed to be a fibroma. Foci of calcification noted. No evidence of syphilis.

8. Glockner. Male, age 76. Death from pyelonephritis. Excrescencelike hard tumors above cricoid, as well as in mucosa of trachea and large bronchi. Microscopically showed to be ecchondroses, with extensive amyloid deposits in bands and clumps. Basement membranes of mucous glands and walls of small arteries involved. Ossified and calcified foci present. Large giant cells often flanked amyloid masses, between which was granulation tissue. Hyaline changes in connective tissue with transition stages to amyloid. Primary tumors regarded as multiple ecchondroses and exostoses, the amyloid representing a metaplasia of the connective tissue trabeculæ (arising from perichondrium) passing through cartilage and bone tissue formation as a result of chronic inflammation. No chronic bronchitis. Lymph nodes and other organs free. No evidences of syphilis.

9. Manasse. Male, age 63. Death from perforated duodenal ulcer. In larynx a large flat and several cherry pit sized tumors showing hyaline cartilage, amyloid and giant cells. Amyloid interpreted as occupying lymph channels. Blood

vessels involved. No evidence of primary connective tissue tumor.

10. Manasse. Male, age 50. Operative removal of tumors from gums, both tonsils and left arytenoepiglottic ligament. Central portions showed cells of sarcomatous characters with amyloid deposited as a network. Giant cells present and believed to be derived from lymph vessel endothelium. Amyloid change in blood vessels. Lymph channels apparently invaded. Original tumors regarded as connective tissue in origin. No recurrence after one year.

11. Mager. Male, age 60. Operative removal of hard projecting tumor attached to both vocal cords. Amyloid as well as islands of cartilage and bone found. Vessels, glands and connective tissue showed amyloid. Tumor believed to be a fibroma with degenerative changes leading to bone and cartilage and amyloid formation.

12. Couvoisier (also Johanni). Female, age 66. Death following tracheotomy because of sudden suffocation. Clinical diagnosis, carcinoma of larynx. At autopsy, on the posterior wall of larynx opposite cricoid cartilage was a firm projecting tumor, 4.8 cm. in height, 2.8 cm. in breadth and 1 cm. in thickness. The flattened upper surface was covered by small nodules. Tumor had a yellowish brown color. Microscopically, tumor contained cartilage and amyloid. The latter involved walls of blood vessels and mucous glands, forming basement membrane rings and in places completely obliterating the gland lumina. Lymph vessels supposed to be filled with amyloid and amyloid bodies believed to be found in the capillaries. Suggests derivation from red blood cells. Giant cells noted at periphery of amyloid masses. Derived these from endothelial cells. Transition stages found between hyaline changes in connective tissue and amyloid. Perineurium of nerves also involved. Regards chronic inflammation as cause of amyloid deposits in the interstitial tissues. Lymphoid and plasma cells in mucosa and bone formation in cricoid cartilage. No amyloid in kidney, spleen or intestine.

13. Gerling and Hüter. Male, age 63. Hoarse for four years. Tracheotomy because of dyspnea. Two symmetrical tumors on posterior wall of larynx, beneath glottis, composed of amyloid masses, with a vascular, cellular intervening tis-

sue. Walls of arteries involved as well as basement membranes of mucous glands. In granulation tissue of submucosa amyloid extended to epithelium. Amyloid also supposed to be in lymph channels.

14. Herxheimer. Male, age 65, suffered ten years from dyspnea and hoarseness. Death from empyema. At autopsy, besides a large abscess in right lung extending to pleura, were found numerous firm nodules up to 1.5 cm. in diameter in right lower lobe and a few in left lung. These tumors were diagnosed as gummata but found to be amyloid. The larynx showed two large symmetrical tumor masses extending from epiglottis to cricoid, with destruction of vocal cords and narrowing of lumen, but no ulceration of mucosa. Also there was a similar tumor mass in trachea. The masses extended to the cartilages but were not attached to them. Microscopically, tumors composed of amyloid masses with foreign body giant cells, foci of calcification and amyloid in walls and lumina of mucous glands, walls of blood vessels and alveolar septa of lung and elastic tissue of pleura. Believes amyloid a primary process, though preceded in some portions by hyaline changes. Is certain amyloid found in lymph channels. Epithelium normal. No amyloid in other organs. No history or signs of syphilis. Careful comparative review of literature.

15. v. Werdt. Male, age 71. History of hoarseness and dyspnea for six years. Death followed shortly after operative removal of tumor on inner wall of arytenoepiglottic fold. At autopsy, in mucosa of trachea on membranous portion were four or five tumors averaging 4 to 5 mm. broad, 3 to 4 mm. high and 1 to 2 mm. in thickness. These reached to primary bronchi, where rows of smaller nodules extended to and into secondary bronchi on both sides. Appearances likened to stalactite formation. Bronchi of right upper lobe calcified and a bone hard tumor fills lumen of bronchus leading to this lobe. Bronchi to other lobes on right side free. On left side bronchi involved throughout. Microscopically, tumors composed of cartilage and bone in varying amounts with extensive amyloid formation. Mucous glands and walls of arteries involved. Giant cells and foci of calcification present. Amyloid believed present in lymph vessels. No hyaline changes noted. Corpora amylacea seen in lung alveoli. Diffuse inflammation

of mucosa of trachea but tumors purely local. Amyloid found in peritracheal lymph nodes but not in any other organs. Regards amyloid as local disturbance in nutrition caused by chronic inflammation.

16. Meyer. Male, age 57. Death from chronic nephritis and apoplexy. In lungs, which weighed 2,000 grams, were hard nodules, the largest (size of an apple) in lower lobe; another, size of small apple, in upper lobe, and numerous smaller, pea to bean sized nodules, throughout pulp. Tumors composed of cartilage and islands of bone with amyloid deposits. Giant cells present. No amyloid in liver, spleen or kidneys. Suggests chronic congestion of lungs as an etiologic factor.

Of these 16 cases, 11 were males and 5 females. The ages ranged from 33 to 78 (average 61). There were 11 cases showing involvement of larynx, three of trachea and bronchi and three of lung. In eight of the cases bone and cartilage were present, and three authors noted lime salts. Syphilis was present in two cases. Transitions from hyaline tissue were recorded six times, and in the same number giant cells were observed.

LOCAL AMYLOID OF THE TONGUE.

The localized presence of amyloid in the tissues of the base of the tongue presents perhaps the most obscure problem furnished by instances of this peculiar disease. A rather careful search of the literature reveals the following cases which are reviewed in chronological order:

1. Ziegler. Male, age 67. Three rounded or oval nodules in base of tongue, two on left side, one on right. Raised above surface but covered with intact epithelium. Masses of amyloid, walls of vessels involved. Larynx thickened on posterior wall and in region of cricoid. Two pedunculated polyps on false vocal cords, which showed amyloid change. Scars in liver diagnosed as syphilis. Traces of amyloid in scar tissue and in liver capillaries near scars.

2. Zahn. Male, age 38(?). At base of tongue on right side two rounded firm projecting tumors, one 13 mm., the other 19 by 12 by 15 mm. Central portions showed bone and cartilage with surrounding amyloid and hyaline changes. Amy-

loid also in rings around gland. Foci of lymphocytes. Author believed tumor originally an osteofibroma.

3. Kraus. Two amyloid nodules at base of tongue in midline.

4. Schmidt. Male, age 58. Death from emphysema of lung and bronchitis. At base of tongue on right side was a projecting tumor 18 by 15 mm. Inside of this, near midline, a smaller buried nodule, 8 by 5 mm. Amyloid in masses and involving basement membranes of glands. Calcification and small islands of bone in mid portions, also small rounded masses of hyaline cartilage. Walls of arteries involved. Concluded amyloid was in lymph vessels. Giant cells present. Lymphocytes present. Small mass of cartilage in right tonsil. No evidence of syphilis. No amyloid in other organs.

5. Schmidt. Female, age 60. Death from emphysema of lungs. At base of tongue on right side was a firm buried nodule 9 mm. in diameter. Resembled other case in every respect. Small center of bone. No signs of syphilis or amyloid in other organs. Believes all such tumors closely allied to bone and cartilage production.

6. Martucelli. Pedunculated tumor size of walnut at base of tongue.

7. Saltykow. Male, age 80. Death from apoplexy and tuberculous pneumonia. At base of tongue a pea sized abscess. To left of midline a cherry pit sized firm mass in submucosa showing amyloid in rounded masses with giant cells and involving glands and arteries. Small foci of calcification and bone formation. Review of literature.

8. Edens. Male, age 39. Death from accident. In base of tongue a slightly raised tumor 2.2 cm. by 1.2 cm., showing amyloid which enclosed glands by rings and contained lime salts but no cartilage or bone. Lymphocytes in neighboring tissue. Scar on prepuce and syphilitic aortitis. Regards amyloid as a primary chancre in tissues. Reviews literature. Believes amyloid due to circulatory disturbances and local inflammation.

9. Gross. Male, age 57. Operative removal (first exploratory for diagnosis; later whole tumor) hazelnut sized mass from base of tongue giving swelling under mucosa and extending nearly to epiglottis. Small abscesses near tumor

found at operation. Clinical diagnosis, carcinoma. Patient showed no recurrence at end of year. Tumor revealed masses of amyloid involving membrana propria of glands and walls of vessels. Intervening delicate connective tissue fibrils. No evidence of amyloid in lymph channels. Scattered groups of lymphocytes. No history or signs of syphilis. Patient suffered for years from hoarseness. This and local abscesses probably favored amyloid formation.

10. Henke. Cherry sized dense amyloid tumor at base of tongue, showing giant cells, cartilage and calcification.

11. Heller. Male, age 71. Death from chronic emphysema of lungs. Two projecting tumors at base of tongue, one on each side, the right size of walnut, the left size of cherry. Amyloid involving glands and blood vessels. Lymphocytes in region of amyloid. Foci of calcification and ossification. Masses of amyloid seen in supposed lymph channels. No evidence of syphilis or previous local tumor. Mentions observing amyloid change in stroma of carcinoma at base of tongue.

12. Schilder. Female, age 56. Death from pulmonary tuberculosis and bronchopneumonia. In base of tongue three small nodules ranging from size of hemp seed to that of a pea. Masses showed amyloid affecting mucous glands and muscles, fading into surrounding tissue. Stroma infiltrated with lymphocytes and plasma cells.

13. Schönhof. Male, age 62. Death from chronic tuberculosis of lungs. At base of tongue to right of foramen cecum was pea sized projecting, half rounded, dense, translucent tumor. Smaller similar nodules in mucosa directly in front of foramen cecum. On right margin of tongue opposite base were two pea sized waxlike tumor masses and on left side a somewhat smaller projecting nodule. On the right side of ventricle of larynx and involving the right false vocal cord was a small lobular tumor, and in the midline of the larynx as well as in the depths of recessus pyriformis were several flat wartlike nodules. All these tumors showed amyloid with giant cells affecting tunica propria of glands and striated muscles. Amyloid apparently in lymph channels. Surrounding stroma contained lymphocytes and plasma cells. No cartilage seen. Suggests tuberculosis with local inflammation as etiologic factors.

As with local amyloid in other locations, the male sex is predominantly attacked. Of the ten cases in which age and sex are given, eight were males and two females. The average age is 59 years, with extremes of 39 and 80. The late incidence of amyloid in the tongue and respiratory tract as compared with that in the eyelids is partially explainable by the fact that, as a rule, amyloid in the former location is only revealed at autopsy, while in the latter it is readily discernible from its early inception. Other and more obscure factors, however, must play a major rôle, as the average discrepancy in ages of the two sets of conditions is about 30 years.

In addition to the three sites for local amyloid, cases of which have been discussed above, scattered references to amyloid in other locations have been collected and will be classified and briefly reviewed.

LOCAL AMYLOID IN TUMORS.

1. Fitz. Female, 30(?). Lymphoma size of pigeon's egg in neck at angle of jaw of three years' duration. Greater portion amyloid. Some leucocytes.

2. Kruckmann. Male, age 61. Tumor of side of neck of sarcomatous nature showing hyaline and amyloid, bone and calcification, and giant cells.

3. Hildebrandt. Female, age 36. Round cell sarcoma of sternum containing corpora amylacea giving reactions for amyloid. Collected six cases of tumors with similar findings and two cases with corpora amylacea not giving reaction.

4. Lohrisch. Male, age 49. Mixed cell sarcoma of mediastinum containing corpora amylacea giving amyloid reaction. Discusses pathogenesis of these bodies.

5. Ophüls. Male. Case of syphilis showing multiple tumors of ribs, spinal column and sternum with amyloid and amylaceous bodies in tumors. Believes tumor syphilitic. Amyloid also in kidneys, heart and spleen.

6. Tschistowitsch and Akomow: Male, age 42. Death from pneumonia. Hard tumor, size of man's fist, in retroperitoneal region between folds of mesentery. Cut surface showed caseous appearing areas. Microscopic, thick network of fibers with lymphoid cells in between. Amyloid in stroma,

in walls of arteries and in lumina of lymph channels. Hyaline changes in connective tissue. Lymph and blood spaces dilated into angiomalike formations. Ulcer in small intestine in close relation to tumor. No evidence of syphilis. Case regarded as unique.

7. Edens. Female, age 66. Death from chronic nephritis. Amyloid mass size of a small apple on left sixth rib. Amyloid also in liver, spleen and kidneys.

8. Jaquet. Female, age 48. Lymphosarcomatous tumors in thyroid, lymph nodes of neck, liver, mediastinum and left axilla. Primary in mediastinum. Amyloid in mediastinal tumor in stroma and arteries; also nodes of neck. None in nodule in liver and none in pulp of liver, spleen or kidneys.

9. Hueter. Male, age 58. Case of chronic nephritis and multiple myelomata of ribs, sternum, left clavicle, humerus, scapula, around left shoulder and in ileum and jejunum. Tumor around shoulder and ulcerating tumors of small intestines contain amyloid. Refers to case of Askanazy.

LOCAL AMYLOID IN INTESTINES.

1. Schnützen (reference by Edens).

2. Neumann reports cases (reference by Askanazy).

3. Askanazy. Female, 58. Death from multiple myeloma and chronic nephritis. In jejunum on outer surface numerous nodules from almost invisible to size of pinhead, showing amyloid involving muscles and vessels. No amyloid in liver, spleen or kidneys.

LOCAL AMYLOID IN URINARY BLADDER.

1. Solomin. Female, age 73. Death from chronic nephritis. Posterior wall of bladder, dense homogeneous yellowish layer 8 cm. in diameter, with some ulceration and composed of amyloid. Giant cells present.

2. Luksch. Female, age 24. Death from pulmonary and laryngeal tuberculosis. In urinary bladder were protuberances of irregular size and yellowish color seated in muscular layers up to 2 cm. in diameter. Masses showed amyloid with foci of calcification. Regarded the tuberculosis as an etiologic factor.

LOCAL AMYLOID OF URETHRA.

1. Tilp. Male, 58. Death from lobar pneumonia. History of alcoholism. No history of gonorrhea. Amyloid mass in midpart of spongy portion measuring several centimeters in length and 2 to 3 mm. in height. No inflammation noted. No amyloid in liver or pancreas.

LOCAL AMYLOID OF HEART.

Beneke and Bönning. Male, old. Death from bronchitis. Marked atrophy of all organs. In heart and in vessels of lungs found amyloid. None in liver, spleen or kidneys.

LOCAL AMYLOID OF NOSE.

1. Grawitz. In the nose of a horse, age 7 years, several tumors from size of hazelnut to walnut which obstructed respiration. With a tube in trachea horse worked nine and one-half years. When killed nostrils completely filled with cauliflowerlike hard masses of amyloid involving vessels and basement membranes of glands. One wartlike amyloid tumor in trachea near artificial opening where there was marked chronic inflammation. Thinks case one of rhinoscleroma.

2. Rabe. Saw connective tissue tumors with amyloid on each side of nasal septum of a cat.

3. v. Joest. Amyloid deposits in nose of a horse; also amyloid in breast tumor of a female dog and in multiple tumors of domestic fowls, especially turkeys.

4. Wolf. Describes amyloid tumors in nose and trachea of a horse.

5. Roeger. Male, age 35. Tumor of nose with structure of a round cell sarcoma and showing hyaline and amyloid changes.

The case which forms the basis for this review was that of G. H., male, age 40, who was admitted to the university hospital five weeks before his death, presenting the typical signs and symptoms of toxic thyroidism. His history revealed, among other things, the occurrence of chancroid, buboes and gonorrhea at the age of 19 and a chancre at the age of 36. His blood Wassermann reaction was positive two years later. He was married at 24 and had one child, 11 years old. His wife had one miscarriage. Evidences of toxic thyroidism had been present for the past four years, one operation three years ago giving him only partial relief. While in the hospital he showed marked weakness, a fine tremor of the fingers, exophthalmos, a pulse ranging around 120, and a prominent thyroid tumor which gave a thrill and bruit. Differential blood count showed the presence of 50 per cent lymphocytes on two different occasions with total leucocytes of 6,850 and 7,150 per cu. mm. The blood Wassermann reaction was positive on three different occasions, but two Wassermann tests of the spinal fluid were both negative. There was marked pyorrhea alveolaris.

Postmortem examination, performed sixteen hours after death, revealed the following conditions:

1. Hyperplasia of thyroid gland (weight, 195 grams).
2. Acute purulent tracheobronchitis with bronchopneumonia.
3. Syphilitic aortitis.
4. Hypertrophy and dilatation of heart with coronary sclerosis.
5. Old healed fibrous pleuritis.
6. Operative scar at base of neck.
7. Persistence of thymus (weight, 60 grams).
8. Pyorrhea alveolaris.
9. Acute and chronic tonsillitis.
10. Ossification of tracheal and bronchial cartilages.
11. Tumor mass at base of tongue.

The mass in the tongue represented almost an accidental finding. While demonstrating the inflammatory conditions of the tonsils and trachea a firm area was felt in the tongue and section revealed a well localized hard grayish white nodule about 1.5 cm. in diameter and lying deep in the muscle behind the circumvallate papillæ and well to the right of the midline. There was no appreciable swelling of the mucosa or tongue substance which might suggest the presence of the tumor. It was not encapsulated but firmly attached to the tissue of the muscle and surrounding mucous glands. Its cut surface was smooth and with its resistance to sectioning and whitish appearance suggested a chondroma. Portions were fixed in 10 per cent formol and Zenker's fluid.

Histologic examination shows a central area composed of a homogeneous, hyaline substance arranged in irregularly shaped bands and rounded masses which were partially fused, with occasional intervening clefts showing connective tissue nuclei and a few fibrils. With methyl violet and also with iodin this substance gives a staining reaction typical of amyloid. In the midportion are a few spicules of osseous formation, and surrounding this are occasional collections of basic staining granules suggesting calcium salts. At the periphery of the mass the amyloid invades the glands and surrounding muscle and fat tissue by irregularly projecting nodules which exhibit a gradual transition to normal appearing tissue without well defined or sharp limits. The mucous glands show changes which vary all the way from complete obliteration and replacement by rounded clumps of amyloid to structures in which only a narrow circle of amyloid has replaced the basement membrane. These "circles" are quite conspicuous, wherever the amyloid borders gland lobules. The eipthelial cells lining such affected glands are visible in all but those in which the obliteration is complete, often showing as a small collection of atrophic cells in the center of a thickened amyloid ring. A few clumps of amyloid in the region of these glands are surrounded by a narrow but distinct zone of flattened cells suggesting a channel which the amyloid substance has invaded or in which it has progressed. Toward the striated muscles gradual changes are not so easily observed. At no point can be distinguished any hyaline changes in the muscle fibers themselves. The amyloid exists in the connective tissue trabeculæ, which have replaced the lost muscle and which in a few places show a true hyalinization not reacting to the tests for amyloid. No involvement of vessel walls was noted.

The epithelial lining of the tongue above the mass is normal, but the underlying connective tissue, including the unaffected mucous glands, shows a focal infiltration of lymphocytes and plasma cells and in places distinct increase of the fibrous connective tissue. Careful search in sections from the kidney, spleen, liver, lungs, bronchi, tonsils, thyroid, thymus, heart and aorta fails to show any evidenec of the presence of any substance even remotely suggesting amyloid.

DISCUSSION.

A review of this case shows that in a man, aged forty, who suffered from syphilis and toxic goiter, there was also found a small mass of amyloid about the size of a split pea, embedded in the substance of the right side of the base of the tongue behind the circumvallate papillæ. This mass contained bone and lime salts and was definitely invading the surrounding structures, attacking the mucous glands by first forming a ring at the site of the basement membrane and gradually replacing the entire gland. No transformation of striated muscle into amyloid was observed, but apparently the muscle substance was replaced by fibrous connective tissue which, in turn, became hyalinized and was then replaced by amyloid. That the hyaline was a precursor of amyloid change in these areas cannot be doubted. The amyloid clumps surrounded by a circle of flattened nuclei, which to so many authors has suggested a resemblance to lymph channel endothelium, is subject to another interpretation. This appearance was seen only in the region where mucous glands had been destroyed and the connective tissue stroma of these glands often retained its identity even when the gland structure itself had almost entirely disappeared. The encircling flattened nuclei may well represent, in every case in which they are described, not lymph vessel endothelium but surviving connective tissue stroma cells, so often appearing in the midst of amyloid masses seen in the liver, spleen and kidney, in cases of general amyloidosis. In respect to the genesis of such deposits, the case gives suggestive hints. In the first place, there is present ample evidence of local chronic inflammation, a phenomenon which has been interpreted by some authors as preceding, and by others as resulting from the presence of the amyloid tumor. The occurrence of local amyloid deposits following chronic trachoma, the constant association of general amyloidosis with chronic infections, as well as the absence of any real evidence of local irritation produced by accumulations of amyloid in the body, all point to the reasonableness of the conclusion that in this, as in other cases, the inflammation preceded the amyloid but afforded a basis for the changes preceding its deposit. Of further significance is the almost constant association, as in the present case, of foci of ossification and calcification, as well as hyaline changes in the adjacent connective tissues with the amyloid masses. In the case under discussion this tendency to early changes in comparatively inert substances is emphasized by the discovery of ossification occurring in the tracheal and bronchial cartilages. The presence of a general chronic disease, such as syphilis, and, in addition, toxic goiter, furnishes sufficient basis for postulating a theory that local metabolic disturbances bring about a destruction of the more highly differentiated elements with some close relation between ossification and amyloid formation in the resulting process. The discovery by chemical analysis of chondroitin sulphuric acid in amyloid emphasizes the chemical resemblance of amyloid to hyaline cartilage, and even in those cases where this acid could not be found this resemblance is still suggested by the similar physical properties and staining reactions of the two substances.

A process, then, so closely allied to the formation of cartilage that true bone may be laid down in it and that results from a disordered metabolism produced by local inflammation plus generalized systemic intoxications may be a reason, if not a satisfactory explanation, for these strange formations. The occasional local deposits of amyloid in the mucous membranes of the respiratory tract in close association with cartilage forming connective tissues lends further support to this conception.

Why amyloid should be formed in the base of the tongue and always, when it does occur, in the same portion (posterior to the circumvallate papillæ) is not at all clear. The comparative frequency with which the follicular glands are subject to inflammatory processes, close association with the hyoid bone, developmental confusion of the tissues of that part of the tongue because of the thyroglossal duct, or the relative immobility of that portion and because of this fact and the peculiarities of its circulation, its exposure to chronic congestions of blood and, more especially, lymph circulation, all may be urged as reasons for its vulnerability to this form of degenerative lesion. The true explanation for this fact, as well as the comparatively infrequent occurrence of local deposits of amyloid in the urinary bladder, intestines, lymph nodes and tumors must remain obscure until such time as we can fully understand the exact conditions under which this peculiar insoluble proteid amasses itself in the tissue spaces.

One further point deserves consideration. The frequent association of syphilis with the occurrence of both general and local amyloid deposits raises the question whether this substance may not be a direct local reaction to the syphilitic virus, a reaction closely allied to the usual gummatous type of necrosis. Perhaps local amyloid tumors are only modified gummata. The facts do not, however, favor such an assumption. Not only does amyloid occur in cases which are completely free from any clinical suspicion of syphilitic infection, but also these tumor deposits often fail to show any lesions which would suggest a syphilitic origin.

Finally, there seems little or no justification in this case or, indeed, in a large majority of the other cases, for postulating the previous formation of a fibroma or other tumor process. The histologic picture alone negatives this view and, while amyloid undoubtedly does occur in tumor formations, we must regard the tumor as an accidental locus and not in any sense a determining factor of the amyloid disease.

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LXXIII.

TRIFLES THAT COUNT FOR EFFICIENCY.*

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"Perfection is made of trifles; and perfection is no trifle," said Michael Angelo.

Not every trifler becomes a Michael Angelo; nor will any of us, unless, like the great master, he gives the greater part of his energies to the major aspects of his work, heeding but not unduly stressing these minor matters. When I try to give you what may be called "wrinkles," I hope they will not with you be merely "crows' feet," as you laugh at the elder member trying to teach you things you may have cut your medical teeth on. Our caustic friend, John Green, once said that he "had to search the dustiest archives of the specialty to find the new things Dr. Blank brought out in his communications." I have little doubt that most of the points I wish to make are well known to all of you: yet it is a fair question—"Do you sufficiently impress them on the attention of those whom you teach?" It is mainly because men of long experience in our specialty have praised some of them as new or ignored that I venture to bring them here forward.

In obtaining the histories of our cases, have we not commonly found that many of our patients' data are vague, contradictory or irrelevant and that we must correct them in the light of our actual findings? "I never had trouble with that ear," reported patients with perforated, scarred or pus crusted drumheads. Dr. Edward Woakes always looked first to the drumheads of his nose and throat cases to see what tales they might tell upon the upper respiratory tract; and it is good policy to reverse this and begin in our ear cases by examining the nares and fauces. Yet some would say that it takes too long thus to study the side issues—hence the importance of taking short cuts and learning to inspect the nasal passages fairly adequately by lifting the nose tip with the thumb, spreading the ala. Most men have the patient say "ah" to show the fauces: have them inspire noisily and one can commonly dispense with the tongue depressor, as with the speculum in the nose. We cannot always stop to explore the lungs, especially with bared chest, upon mere suspicion of tuberculosis: but we can detect readily, even by inspection, quite surely by auscultating through the clothing, and prolongation of the expiratory sound at the apices such as is usually an early, almost prodromal, sign of tubercular infiltration of that region.

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*Presented with twenty chart illustrations at the American Otological Society meeting, Boston, May 30.

In examining the auditory canal and drumhead—better that one first which is supposedly normal—we can often dispense with any specula if we rightly use traction—up and back in adults; down and back in young children—on the auricle and look through the sight hole of the mirror. In thus placing the eye in the center of the full cone of light from the head mirror, we secure better illumination for the whole drumhead as well as for the upper pole especially. This counts greatly in narrow canals, as in infancy, but most when using the pneumatic speculum, for with it much of our light goes to waste, reflected from the inner as well as the outer surface of the glass closing the speculum, and if this be a magnifying lens the loss counts four-fold. An older colleague used to teach that only a beginner needs this sight hole; so soon as he got out of baby clothes he turned his mirror up on his forehead and looked under it like a master. I have always believed that this explained why in 23 years he had seen but 20 cases of attic suppuration with Shrapnel perforation, of which I reported several series of 40 a year, as more correctly showing their frequency.

In thus drawing the ear straight we can at once notice any indurative stiffness of the canal and diagnosticate eczematous infiltration, even though all surface lesions are absent.

In our testing of the hearing, does any treatise advise that the tuning fork be always pointed towards the ear so that the sonorous vibrations of each tine shall reinforce, not neutralize, those from the other? Thus we get maximal audible, with minimal palpable vibrations, so that the patient is less likely to claim that he hears what he only feels. Would the Galton whistle be as lightly regarded if its opening were always turned from the ear, its sounds elicited by successive pressures of its bulb without any intake of air, and its orifice held near the Darwinian tubercle at the upper margin of the helix where its whistle is readily heard to the limit, while its puffing is nearly inaudible? Scrutinize the whistle offered you as Galton's to make sure that it somewhat approximates the genuine, does not sound to or above the zero point, etc. Need we cumberously time with a stop watch the duration of bone conduction in Schwabach's test and the normally double sounding time for air conduction, when the Roosa Rinné test tells us in an instant whether the bone or the air conduction preponderates: and the Gardner-Brown test as quickly tells how much the bone conduction is above or below the normal? In case of tinnitus, must we scruplously cleanse the nares and pharynx and inflate by catheter or bag to test eustachian patulency? when by Politzer's test with the tuning fork vibrating before the nostrils the patient may at once tell us whether or not the tubes open in swallowing and pass the sound waves more fully to the tympanum of one or both sides.

When our tuning forks tell us that we are dealing with nerve deafness (combined or not with obstructive lesion), must we get a Wassermann report—perhaps sowing discord in families, since the public is quite alive to the significance of "blood tests"—when the evidence may be already staring us in the face? Not that the serrated tooth edges are Hutchinson's "notched teeth," as I have heard them designated; nor that the teeth of the second set need be notched to tell the story. The pegged teeth, with curved sides and narrow cutting edges, widely spaced, are almost as typical, though marking a more attenuated inheritance. I have never forgotten a boy with bad corneæ not improving under the care of a skilled oculist, who did not seem to have a mere phlyctenular keratitis, although it was not typically interstitial. He had some percussion dullness and prolonged expiration at the apices. In spite of perfect teeth, I asked of the physician who brought him as to the family history, any miscarriages or other luetic evidence, but learned only of a runaway father of a bad sort. At a later visit an elder sister brought him, a plendid six foot Juno of a trained nurse, whose teeth were typically Hutchinson, justifying the antisyphilitic medication which was beginning to secure his improvement. At her next visit she had had all notching filed out of her teeth; but they showed still their spacing and pegging. In another case, a well developed girl of 15, the extreme deafness was ascribed to mumps and proved to be nerve deafness. Neither she nor a young cousin accompanying her could give any significant further history and, with well shaped teeth, I was about to accept the mumps as cause, when a faint violet injection around the corneæ caught my eye, the ophthalmoscope showed a vascularized interstitial keratitis and a closer look showed the teeth to be artificial. In a wholesome looking girl of 15 the upper incisors must have been pretty bad to require this replacement. She improved distinctly but not lastingly under antiluetic treatment. In many other cases where the taint is doubtless acquired and the teeth are normal and the hard palate is not suggestive, the velum shows brick red quadrate patches which Carl Seiler called attention to as positive evidence of syphilis. These are not marginal, as are most palatal injections, but symmetrically placed nearly in the middle of each side of the soft palate.

Of course it should be needless to refer to the typical specific facies, with scarred mouth angles, exaggerated nasolabial lines, saddle nose and specific tarsitis which may accompany and accentuate the keratitis. In examining the pharynx and larynx we have the good general rule, of which the instances outnumber the exceptions, that posterior lesions are tubercular; anterior, syphilitic. No small group of nerve deafness cases are merely neurasthenic and fleeting, and we note a scalloped, tooth marked tongue margin as indicating nux vomica for the flabby patient who has so puttylike and flabby a tongue.

As in the inspecting, so in the treatment of the nose and throat these simple measures are of great convenience. The thumb serves not only to reveal the anterior nares but, as a rest for the atomizer tip, relieves all chance of giving or receiving infection by its contact, makes injury through sneezing or other sudden forward movements of the patient unlikely; while the slight abrasion of the mucosa which the spray itself can cause is obviated by the distance of the tip outside the nose. Our Philadelphia method (Walter Chrystie) of one hand management of the ball atomizer makes this convenient at all times as well as at the bedside; and I rarely use the compressed air tank in spraying, considering a pressure of from five to ten pounds adequate and usually safer; and through the catheter it is satisfactorily used up in the eustachian tube, penetrating at least as far as by any other method. In this connection I would renew claims for S. D. Risley's method of using the ball tipped Politzer bag, which never jams in the catheter, yet gives good pressure without leakage. Any valve in the bag is needless, and medication of the air is conveniently secured by merely filling the bag in the mouth of the bottle of iodin, ether, etc.; and Lowenburg's admirable test whether chloroform vapor feels cold in the otosclerotic tympanum may aid us in that difficult diagnosis. Incidentally it may be said that Bezold's "triad" are present in most cases of chronic catarrhal deafness and do not at all indicate, as do this Lowenburg sign and the Schwartze flush of the promontory, a true osteoporosis of the labyrinth capsule.

When employing the catheter for each ear from the one nostril, I have been amazed that many experienced aurists have hailed it as a new method, although it was used by Cleland and the earliest exponents of catheterization through the nose; yet it was seemingly forgotten by Voltolini and others, whose removal of nasal spurs and other irregularities was mainly to facilitate the introduction of the catheter rather than to relieve the irritation and improve the ventilation of the obstructed naris. After using the catheter it should always be wiped with a tuft of clean cotton, so that any blood upon it may give evidence that the mucosa has been wounded and warn against any vigorous nose blowing or Politzerization which might cause emphysema. I am almost afraid to state that in 40 years I have never seen emphysema caused by myself or any of my assistants, even when the catheter was entrusted to undergraduate hands. Yet I have been told that this ball and socket catheter inflation is too rough to be safe! I hold that catheterization is a procedure, not "an operation" —there should be no real pain or bloodshed; and I strongly advise against cocainization.

The use of fluids per catheter, whether introduced by the atomizer or by a dropping tube to be sprayed up by the blast of the Politzer bag, has as one of its major values, the exciting of swallowing efforts as some of the liquid escapes into the throat; for the floor of the eustachian orifice is formed by the thinly covered lavator palati muscle, which lifts the catheter beak snugly into perfect position, while dilating the tube for the readier admission of the inflation.

In Politzerization it is usually claimed that the pressure must be equally towards each ear and that we must turn to the catheter if we wish to lateralize the effect. Aside from the safeguarding of one ear secured by closing its meatus with the finger, which furnishes a cushion of slightly compressed air to support the drumhead and even transmit a trace of counter pressure down the tube, one rotates and inclines the head to meet the finger and thereby tends to compress this side of the pharynx and tube mouth, while dilating the opposite. Furthermore, the air tends more strongly toward the opposite tube while passing by the nearer one; so it is one of the many things in otology which "go by contraries" that preponderatingly to inflate the right ear we should use the left nostril for the Politzer bag.

As a prelude to any form of inflation, the spraying clean of the tube-mouth region should be supplemented by mopping, more thoroughly to cleanse it. In this we do well to remember, as Harrison Allen taught, that the lateral pharyngitis points definitely upward to trouble of this part of the posterior nares, which in using his applicator bent at about a right angle we gently but efficiently reach, if we bear in mind the jutting out of Passavant's cushion to complete the closure of the pharynx in swallowing. Unless this is fully heeded we may fail to understand the formation of crusts which lodge above it and constitute Thornwaldt's disease; or we may injure its thin edge in forcing through it rather than past it to mop the vault. Squeezing out the excess of medicament is especially needful if we have the patient expose the throat by inspiration, lest its unintended laryngeal application be too irritating. It is hardly inappropriate to call attention, as did Harrison Allen, to the value of the aneurism needle as explorer of the tonsil crypts and as our safest instrument for opening quinsy or postpharyngeal abscess. In quoting Harrison Allen it may be well to recall that he advised more than thirty years ago the divulsing of the bands of adhesion in Rosenmueller's fossæ, to which Myles called attention some fifteen years later, Jervey later still; and now the osteopaths have discovered—so that by their manipulation at the front of the vertebra they claim to cure tinnitus, deafness and all aural ills. I have found it occasionally quite useful during these thirty years.

Douching the ear is one of the simplest of aural measures; yet one rarely done well, if we may judge from the writings on the subject. Probably it is regarded as too easy to be worth discussing, a mere nursing matter hardly worthy of the surgeon's attention; yet not always relegated to the more conscientious care of a nurse. Many warn against its use: and as they seem to misuse it, the warning is wise. Politzer and others who speak of the temperature at all mention 88°. (Luke must have been rather coldblooded if 88° is "lukewarm.") A general bath should be 105° to feel "hot" to the body surface—to the inflamed ear 105° may hardly miss feeling cool, since the local temperature may be at least as high. Yet douching is an admirable way of cleansing, removing wax or other foreign bodies (wax has no more right to be in the depth of the canal than shoe buttons or cherry stones), but especially of applying heat, our best and most penetrating astringent, to the inflamed ear; and 115° is usually the best degree—bearable yet positive. Tediously to test the fluid with the thermometer is needless if the surgeon will throw the jet upon the thin skin between the fingers; here 110° is hot, 112° very hot, at 115° the hand tends to pull away, at 117° most persons snatch away the hand. Much of the impression of heat, however, depends upon the rapidity with which it is applied. Our tissues are poor conductors, not truly nonconductors; slow drops of boiling water can be tolerated, while a rapid flow at 115° may seem hotter. We must begin gently with any douching, although having it uncomfortably hot, therefore, avoiding any fright to the patient; then as he becomes confident and the fluid in the bottom of the canal tends to lessen the penetration of the hotter water, we can press our syringing more forcibly. Any air bubbles make the flow intermittent and jarring—so the syringe should be emptied of all air if he is to be tolerant of force, which is the equivalent of speed of flow and vigor of impression. Quantity is almost as important as degree in the effect of our caloric, so a pint or two is usually requisite. This is tedious except with the gravity douche, and the intermittence of the bulb or piston syringe is a drawback; but with two bulbs, one filling while the other is being emptied, a virtually continuous flow can be secured. The Fowler "suction bell" has its advantages for this as for the Barany douching—which should remind us to look out for vertigo and nystagmus, which usually appear before any moisture of the brow and temple.

LXXIV.

ACUTE ABSCESS OF THE LATERAL WALL OF THE LARYNGOPHARYNX.

By Charles W. Richardson, M. D.,

Washington.

Clinically we occasionally meet with conditions which we have not seen described in the literature, which seem to us unusually rare, and which cause us either to doubt our clinical acumen, or wonder if such experience has not been the experience of others who have for various reasons not given description to their findings.

The condition which I propose to report briefly today is the occurrence of an abscess in the laryngopharynx. In this region, occasionally, we have abscesses directing their way down from the peritonsillar pus formation. In this type of laryngopharyngeal abscess we have the easily recognized relationship with the coexisting peritonsillar abscess. The form of laryngopharyngeal abscess which I shall describe is primarily an abscess of this region, with an absolutely normal faucial region. In the past ten years I have seen three primary abscesses of this region, two of which I have observed in the past eighteen months. From the clinical account of a case which terminated fatally in the practice of a colleague, I believe that he had to do with an abscess of this character.

The etiologic factors which enter into the formation of an abscess in this region have been difficult for me to elucidate. It is possible that a lymphatic gland, numerous in this region, might have become infected, or some article of food containing a foreign body might have slightly incised the mucosa and thereby produced infection.

The symptoms are quite characteristic. The onset is quite sudden. Pain is usually the earliest symptom. The pain is very intense and is located just below the angle of the jaw, over the great cornu of the hyoid bone. Tenderness to pressure in this region is very marked. Pain in swallowing is exquisitely pronounced. The pain is so great as to render sleep fitful and unrefreshing. There is a profuse secretion of mucus, but no insalivation. There is a noticeable tumefaction to the touch on the second or third day, which no doubt would become markedly visible did not spontaneous or artificial evacuation take place. Respiration is not affected and the voice is usually normal. Chilly sensations are present from time to time. The temperature is septic, but with only a moderate wave. The patient is decidedly uncomfortable, restless, anxious and entirely disturbed about the issue of his case.

Local manifestations: The faucial regions appear normal; no tenderness about tonsils. Depression of the tongue is painful. Through the use of the laryngeal mirror a distinctive swelling can be observed protruding inward in the lower pharynx on a line with the fossa navicularis. This region has a slightly congested appearance. On the second or third day distinctive pointing takes place, from which spontaneous rupture with evacuations may take place, or through which an incision may be made which will result in the evacuation of the abscess.

In conclusion I wish to make several observations:

1. The sudden onset.
2. The severity of the symptoms; in particular, the pain.
3. The absence of tonsillar infection.
4. Location well below the lower border of tonsil.
5. The uncertainty of its etiology.
6. As rare as it seems in my clinical work, I am sure that many of the membership have seen this type of faucial infection and may help to elucidate what is still unclear in my report.

LXXV.

CHLOROMA WITH SPECIAL REFERENCE TO EAR, NOSE AND THROAT MANIFESTATIONS, WITH REPORT OF TWO CASES.

By W. W. Pearson, M. D.,

Des Moines, Iowa.

Chloroma is a rapidly growing and very destructive new growth usually occurring in the young. It arises from the mother cells of the white corpuscles and is characterized, anatomically, by the formation of tumor masses, some or all of which have a greenish color. These have a predilection for bone and are most frequently found in or on the bones of the skull, but other tissues are also invaded. Usually the tumor cells are found in large numbers in the blood. Histologically chloroma may be divided into the myeloid or lymphatic types, according to the kind of leucocytes present. Clinically the condition most frequently manifests itself by tumor formations in the orbital or temporal regions, by swelling of the face with exophthalmos, tenderness over the affected bones, impairment of nerves due to pressure, a rapidly increasing anemia and cachexia with fever and an hemorrhagic diathesis.

The first description of this disease was by Allan-Burns[1] in 1821, while King[2] in 1853 was the first to name it chloroma. Since then about 100 case reports have appeared in the literature. Many of these are accompanied by most painstaking autopsy reports and pathologic discussions.

It was my good fortune to be present at the autopsy in 1892 of the first case reported by Dock and Warthin.[3] It so impressed me that when I saw my first case the possibility of its being chloroma occurred to me. (It was not, however, until the clinical examination by Dr. Walter L. Bierring that the diagnosis was made. I was called in council because of the orbital condition and ear complications.)

A second case was referred to me and admitted to the Iowa Lutheran Hospital, March 18, 1919, with a diagnosis of orbital abscess. Having recently seen the other case and failing to discover an origin for an orbital abscess, I immediately secured the results of successive blood examinations and became convinced that I was dealing with another case of chloroma. The subsequent history of the case, with death within a few weeks, was also in keeping with the diagnosis. Unfortunately I was defeated in my efforts to secure an autopsy.

It occurred to me that it would be of interest to this society to report the two cases which came under my observation, and to present excerpts from the recorded cases of chloroma which suffered involvement of the ear, nose and throat. (The autopsy findings in my first case with the chloromatous masses in the nasal sinuses, middle ears and right mastoid prompted this consideration.)

Case 1.—S. C., white boy, aged 12, entered the Iowa Methodist Hospital December 31, 1918.

Present complaint: The patient came to the hospital complaining of pain in the right ear and at the base of the brain. He is unable to close his right eye or to move the right side of his face. He further complains of hearing poorly on both sides, and states that he cannot see as well as he did a few weeks ago. He has pain in the right eye and in the lumbar region of his back.

His present illness began two weeks after he had recovered from an attack of influenza which went through the family in the early part of November, this year. He first noticed a "ticking" sensation in the left ear, and then a "thundering" in the right. Soon after this his right ear became painful. During the first week in December the patient observed that his right eye was black and that the eyeball was bulging. A few days later he noticed a bloody discharge from his nose. This lasted for a couple of days. During the time of the discharge his eye felt better. The pain in the right ear has been continuous, and his eyes have become more and more prominent. All of his symptoms have gradually increased.

Past history: He had infantile paralysis at the age of two. All extremities were involved, but he regained the use of all but the left foot, which remained partially paralyzed. Two and one-half years ago the right foot also became partially paralyzed, and since that time he has never been as vigorous as other boys. But he has continued his school work. His appetite is good; he sleeps well. But since his entrance into the hospital his bladder has had to be catheterized. His father states that he was a full term baby and has been an average child in every respect. Family history negative.

Physical examination (W. L. Bierring): The boy is somewhat emaciated. The skin is pale and has a light yellow tinge. He is rather restless in bed. He cannot hear the ordinary voice, but when one speaks moderately loudly he understands questions and replies quickly and intelligently.

Head: The head is well formed. There is a moderate growth of hair. The base of the skull and the back of the neck are moderately tender to pressure. There is also tenderness over both mastoids. This tenderness is slightly more marked on the right side. Both eyeballs protrude markedly —the right more than the left. The right lids are somewhat swollen, purplish in color, and the venules of the lids on both sides are prominent. He cannot close the right eye completely. The right pupil is moderately dilated. The left pupil is normal, and both react to light and accommodation. There is marked engorgement of the lateral conjunctival vessels of the right eye. Nystagmus is absent. The eye movements are limited. He cannot read as well with the right as with the left eye.

There is moderate discharge from both ears. The nose is negative. The teeth are in fair condition. The tonsils are of moderate size. The tongue when protruded points to the right. The patient cannot wrinkle the right side of his forehead nor retract the mouth to the right. The superficial veins of the neck are distended. A few hard lymph nodes can be felt in each anterior cervical region. There is a moderate rigidity of the neck.

Thorax: The lower one-half of the sternum is somewhat depressed. The costochondral junction on the left side between the third and fourth ribs is slightly prominent. There is tenderness to moderate pressure over the upper one-half of the sternum. The lungs show nothing abnormal. There is a slight systolic murmur heard best at the base, but also at the apex. Nothing abnormal can be detected by abdominal examination. The feet are in the position of talipes equinovarus. The reflexes of the upper extremities are normal. The patellar are absent, so are the Achilles. The Babinski sign is absent, but there is a suggestion of a positive Kernig on both sides.

Special examination: This examination, made December 31, 1918, showed marked congestion in both the middle ears. The right ear bulges. The hearing is decreased, a watch can be heard one inch away on the left side, and on contact on the right side. Paracentesis of the right ear drum was made and resulted in a small amount of a heavy discharge. Later this discharge became more fluid. The patient complained of pain over the right mastoid, which was sensitive to pressure. This continued throughout the illness. Radiograms taken on several successive days revealed a cloudiness of both mastoids, more marked on the right.

Eyes: The veins of both retinæ are moderately congested. Before the fatal termination multiple hemorrhages appeared in both retinæ. A marked exophthalmos was present in both eyes, more marked on the right side. A double optic neuritis was also present.

The patient continued to go downhill and died on the last of January. At the entrance there were 2,800,000 red cells and 24,000 whites, with hemoglobin, 45 per cent. On the 13th of January the white count reached 41,000. The day prior to death it was 18,000 with hemoglobin 20 per cent. In the differential count a rather large mononuclear cell, resembling myelocytes, predominated. This type of cell comprised between 90 and 100 per cent of all those found in the blood toward the last. While in the hospital the boy ran a continuous fever, which reached 104 two days before his death. He also developed a cystitis and had to be catheterized. An occasional granular and hyaline cast was found several times.

Autopsy report (Julius S. Weingart, M. D.): The body is that of a white male child, 57 inches in length. It is markedly emaciated. A mottled purpuric rash covers the abdomen and the lower part of the chest. A few purpuric blotches are present on the arms and on the lateral surfaces of the thighs. A bilateral talipes equinovarous is present, and also a dry purulent discharge from the right auditory canal.

Head: The dura in the cranial cavity is found adherent along the sagittal suture over an area 3 to 5 cm. in width and 8 to 10 cm. in length. It is also markedly thickened (in places to the extent of .5 cm.). This thickening is somewhat irregular and nodular in character. It is firm and thickest at the sinus itself, thinning out as it extends laterally. The color is greenish with scattered, dark, hemorrhagic areas. There is some engorgement of the cortical vessels in both right and left occipital regions of the brain. In the dura lining the left half of the posterior cranial fossa a mass about 2 cm. in diameter and 6 to 8 mm. in thickness, circular in shape, and slightly elevated above the surface of the dura, is seen. This has a distinctly greenish tinge. Examination of the venous sinuses shows nothing except that the wall of the right lateral sinus contains thickened areas similar in character to those seen about the superior longitudinal sinus. A small loose clot is found in the lumen. The interior of the right mastoid bone and the middle ear is filled with a gelatinous greenish mass. No definite pus is seen. Similar material also occurred in the sinuses of the sphenoid and in the right ethmoid cells. The brain itself shows nothing abnormal.

Thorax: A large flat greenish mass is seen on the posterior aspect of the sternum. This is of a greenish color, the most chloromatous of any of the tumor masses found. It is 5 to 6 cm. in width and .5 to 1 cm. in thickness, and extends from the manubrium sternum to the xiphoid cartilage. A similar flat greenish growth is found on the right vault of the diaphragm. The pleuræ and pericardium show a number of petechial hemorrhages. In the upper part of the lower lobe of the left lung there is an irregular area of partial consolidation. The heart and great muscles are normal. The mediastinal lymph nodes are not enlarged.

Abdomen: The gastrointestinal canal is negative. No definite enlargement of either mesenteric or retroperitoneal lymph nodes is present. The spleen is not enlarged. It weighs 7.5 ounces. The surface made by section has a reddish, waxy appearance. The liver is normal in size and weighs 3 pounds

3 ounces. The surface made by section appears normal, with the exception of some white striæ running along the blood vessels. Both kidneys are markedly enlarged, weighing 7 to 7.5 ounces and measuring 13 cm. by 6.5 cm. They are both white in color and mottled with hemorrhagic areas. The surface made by section shows a greenish cortex with numerous small hemorrhages in the pyramids. The bladder contains one ounce of purulent fluid. Its walls are extremely congested. Examination of the pancreas and adrenals is negative. The bone marrow from the center of the shaft of the femur is red and gelatinous. Microscopical examination of the wall of the longitudinal sinus shows the thickening to be due to a tumor mass composed of cells, round, or somewhat polygonal in shape, and arranged for the most part in strands between the fibers of the small amount of connective tissue which is present. These cells have nuclei, some of which are pyknotic, others have a loose chromatin network; the nuclei fill most of the cells, so that the amount of cytoplasm is very small. This latter is in many cases acidophilic. The cells are largely mononuclear, but here and there a cell with two nuclei or with a lobed one is seen. The size of the cells varies a good deal. No mitotic figures are found. Sections from the other tumors show precisely the same histologic picture: that of a cellular mass composed of strands and rows of mononuclear cells. The liver shows foci of similar character scattered throughout. Here in addition, a few very large multinuclear cells are seen which resemble closely the megalokaryocytes of the marrow. The normal histologic aspect of the spleen is almost lost. The splenic bodies are very small. Often only a small group of lymphocytes can be seen here and there around the central artery. The rest of the spleen is packed with cells similar in type and arrangement to those seen in the tumor masses. Here very few red blood cells are seen. The marrow is replaced by the tumor cells. The kidney shows large areas where the tumor tissue has obliterated all the normal markings. In places the convoluted tubules and glomeruli are intact, but even here the tubular epithelium shows evidence of degeneration. Numerous areas of hemorrhages occur throughout the kidney substance.

Diagnosis: Myeloid chloroma.

Case 2.—R. B., male, aged 9, entered the Iowa Lutheran Hospital, March 18, 1919, with a possible diagnosis of orbital abscess. On account of my absence from the city, the patient was seen first by my assistant, Dr. Doane, who repeatedly examined the nose but failed to find any evidence of an infection. On March 24, Dr. J. T. Priestley was called in council. According to his report, the patient had been ill for several weeks, complaining of headache, general weakness, and aching of his limbs. More recently his vision had become somewhat disturbed. On examination the patient appears bright and takes a lively interest in things about him. Examination of the chest and abdomen reveal nothing abnormal. The long bones are all sensitive to pressure. The patient is unable to walk, but enjoys going about in a wheel chair. During his stay in the hospital the temperature varied between 99 and 102, pulse between 90 and 120, and respiration between 20 and 30. The urine was negative. The blood examination showed 2,000,000 red cells at entrance; before he left they dropped in number to 1,500,000. The whites were 33,000 at entrance, at one time reaching 56,000; 98 per cent of them were large mononuclear. Hemoglobin, 35 per cent; Wassermann negative. Radiogram of temporal bone showed nothing abnormal.

I examined the patient on March 29 and noted the following: The hearing is reduced on both sides. Examination of middle ear reveals nothing. There is a marked proptosis of the right eye, while the left is decidedly more prominent than normal. Both retinæ show marked neuroretinitis. Pupils react to light and accommodation; the eye movements are but little restricted. Examination of the nose is negative. Before leaving the hospital, hemorrhage of the right retina occurred, and during his last days in the hospital several nasal hemorrhages took place; none were dangerous.

The boy remained in the hospital eighteen days, when he was taken home. He died about two weeks after.

Review of Literature.—Alexander[4] states that he found lymphatic tumors in the labyrinth in leukemia, lymphosarcoma and chloroma.

Benjamin and Sluka[5] mention the frequency of deafness and seventh nerve paralysis in chloromatous subjects. The symptoms are due to the tumor deposits in the temporal bone.

Graupner[6] relates the case history of a boy with a right-sided facial paralysis and vertigo. Both external canals were dropped and a slight discharge of fetid pus exuded from the right ear. The mastoid on this side was painful. Perception of the lower tones was lost. The patient ran a slight fever. The right mastoid was operated upon, and a green mass was found within. The facial canal was involved for a distance of one centimeter. The patient died nine days later, and among other chloromatous changes found was a tumor formation in the inner auditory canal exerting pressure on the seventh and eighth nerves.

Lehndorff[7] prefaces the recital of two case histories of chloroma, stating that in many cases the usual clinical and blood picture is not present from the first. The two cases reported by him entered the hospital as septic diphtheria. The pharyngeal appearance, glandular enlargement, pulse, and temperature were those of diphtheria. One was a boy of 4½ years of age, who had been ill about fourteen days, suffering from a high fever, malaise and swelling of the submaxillary glands. Later he had a very foul breath, difficulty in swallowing, and frequent hemorrhages from the gums and skin and an increasing anemia. Examination revealed the left tonsil greatly swollen with a deep area about the size of that of a dollar covered with a foul gray green exudate that extended to the pharyngeal wall. At no time were diphtheritic bacilli found. There was a remission in the process and the temperature dropped to normal. The pharyngeal condition improved and apparently began to heal. A week later a short turn for the worse was noted, with high fever, increased anemia, and the tonsillar ulcerative process started anew, with increased glandular swelling in the neck. The child was removed from the hospital, but returned a few days later because of a developing dangerous pharyngeal stenosis. At this time the tonsils, palate and pharynx were covered with foul yellowish membrane. The enormous swelling interfered with speech, swallowing and breathing. After a few weeks' illness death ensued. An autopsy by Störk showed that the symptoms noted were due to chloroma.

Lehndorff's second case was that of a nine year old boy who began to suffer from malaise and fever in June. On June 12 he complained of sore throat. Diphtheritic antitoxin was injected on the 20th, and he entered the hospital with the diagnosis of septic diphtheria. The patient was emaciated and pale, with many old and recent subcutaneous hemorrhages. A high fever and rapid, poor pulse were present, and there was a systolic blowing heard all over the atria of the heart. The liver was soft and extended three fingers' breadth below the ribs. The spleen was relatively small, hard and palpable. The appearance of the throat suggested septic diphtheria. The breath was very foul; the tonsils were reddened and swollen; the uvula was swollen. On the left side there was a dirty, grayish yellow ulceration which extended over the left pillars. The exudate on the posterior pillars was thick, yellow and uneven. About the exudate there were hemorrhagic areas. These also occurred in the pharyngeal mucous membrane and on the cheeks. The glands under the jaw were small and painful, and the covering skin was edematous. Smears from the exudate showed diphtherialike bacilli, cocci in chains and clumps, fusiform bacilli and spirilla. The culture showed only staphylococci and streptococci. During the following days new hemorrhages appeared in the skin and mucous membrane, and the pharyngeal condition grew worse. The glands under the sternocleidomastoid were enlarged. The spleen and liver increased in size and grew softer. The following week the throat and pharyngeal condition remained stationary, but the temperature increased. The eye backgrounds were normal, and there was no exophthalmos. The bones were not painful. There was an occasional nasal bleeding. The axillary and inguinal glands were slightly enlarged during the last days of his life. The disease ran its course in about four weeks. The autopsy, performed by Weisner, showed beside other changes a chloromatous color in the glands of the neck and thorax. The histologic findings in this case were a surprise and indicated their importance in making the diagnosis.

Walls and Goldsmith[8] reported a case of a five year old boy, whose illness covered a period of three months. The pathologic report showed chloromatous deposits in the following locations: orbits, frontal bones, nasal sinuses, temporal bone, external surfaces of the parietal bones, attached to the cerebral and spinal dura mater, kidney, liver and posterior surfaces of the sternum. One large chloromatous tumor was found between the eyes. This seemed to push apart the two halves of the face. The distance between the inner canthi was 3 cm. The pathologic findings in the larynx are of especial interest. "The upper part of the larynx shows necrosis as does also the epiglottis and fauces. The nasopharynx exhibits necrosis of the mucosa and submucosa and of some of the layers of striped muscle. Between the bundles of muscle fibers and even between the individual fibers are seen mononuclear cells, some of which are ordinary lymphocytes, but many of them are large cells supplied with large pale nuclei."

Hirschfeld[9] reported the case of an eight year old girl who suffered from a growth beginning in the right antrum, of about six months' duration. When seen by him it exerted pressure outward and downward. The right alveolar process was lower than the left. The nose was crowded to the left. The seventh nerve was intact. The covering skin was cyanotic. The entire tumor was sensitive to pressure. An extension of the tumor up into the orbit and back of the eye produced a marked proptosis. The upper lid covered the eye but the lower one was ectropic. The eye was blind (the result of optic atrophy). The blood examination decided the diagnosis clinically as chloroma. Hirschfeld emphasizes the importance that the blood examination has in the presence of malignant tumors.

Merril and Bedell's[10] case occurred in a boy of eight years with the following ear complications: The external canal of the right ear was moist and almost occluded with inspissated pus. The posterior superior wall was found bulging and moderately congested. The tympanic membrane showed a calcified area in the lower posterior quadrant. Above this was a small perforation through which a yellowish exudate escaped. The left ear showed a similar condition without the bulging posterior wall. Both mastoids were distinctly tender to pressure. No autopsy was permitted in this case, but a chloromatous tumor was uncovered in the left orbit under anesthesia a few days before death.

Bruce[11] reports the case of a married woman, aged 38 years, who suffered from violent neuralgic pains over the temporal region, cheek and upper jaw of the left side. She first noticed a swelling of the gum of the upper jaw in the region of the first bicuspid tooth of the left side. A day or two later she noticed a similar swelling at a corresponding point on the opposite side, and simultaneously a swelling made its appearance around the first bicuspid of the lower jaw on the left side. The pain subsided, but the swelling continued to increase. On examination, about six weeks from the onset, a marked swelling of the gums was seen. There were swellings under the jaw on both sides. The glands were fairly movable and not tender to touch. The other glands of the neck were not involved. The skin was swarthy. The breath was very foul. The teeth were all in line and not loose. The swelling of the gums was very marked, spreading between the teeth, and were convoluted, dark purplish red in color and covered with epithelium. They were firm to touch and did not bleed. The tonsils were not enlarged. Four days later there was an ulceration and sloughing over the first right molar above. A piece was removed for examination, and the pathologist reported that it was probably lymphosarcoma. About four weeks later the patient began to run a septic temperature from 100 to 104 degrees, with a pulse of 110 to 140. The swelling on the left side of the neck rapidly increased in size, as did also the growth on the gums. The breath was very offensive. There was much salivation and she was getting progressively worse. Pus was exuding from around the teeth and gums. It was thought that absorption of this pus was responsible for the temperature. An operation was undertaken with the object of not only removing the growth but of getting rid of the septic condition around the growth and teeth. She survived the operation only a few hours. The autopsy diagnosis was chloroma.

Pfeiffer's case[12] was that of a boy four years of age, who previously had fallen and cut the left side of his forehead, which healed promptly. Several weeks later he suffered with an inflammation of the other ear with a purulent discharge. Following this, the child continued ill with loss of appetite, and became pale. About two weeks later proptosis of the left eye developed. A double papillitis with unequal pupils and limited motion of the eyes were noted. Examination of the left ear was negative, while a small perforation in the right upper posterior quadrant was present. Hearing on the right side was markedly reduced. The temporal and malar bones of both sides, and especially the left, were prominent. Proptosis of the right eye developed. A questionable diagnosis of tumor of the ethmoid or sphenoid and thrombosis of the cavernous sinus following the right middle ear infection was made and the skull opened external to the outer angle of the orbit and above the malar bone. No tumor or occlusion of the veins was found, although exploration with the finger reached the middle line and the region of the pyramid. The wound showed no tendency to heal. There developed a cerebral hernia, the bone margin became necrotic and death resulted after a four months' illness. At autopsy many yellowish green tumors, .5 cm. thick and about the size of a half dollar, were seen on the outer side of the dura. They were especially numerous along the wall of the longitudinal and transverse sinus. They were not attached to the bone. The entire right parietal bone and mastoid were found infiltrated with a yellowish green mass. The left tonsil, although not enlarged, showed the light greenish color. The submaxillary glands of both sides and collections about the larynx showed the same greenish deposits.

Saganuma[13] reported a case in which both maxillary antri contained tumors.

Wynter and Laken[14] report a case with the following autopsy findings: "The face is distorted. There is a considerable bulging of the cheeks due to immovable swellings in the superior maxillæ. Proptosis is present and the bridge of the nose is broadened and flattened. The skin below the eyes and upper portion of the face shows a greenish purple discoloration. Bleeding has evidently taken place from the gums and there are thickenings along the inner side of the lower jaw."

Pfeiffer discusses the clinical diagnosis of chloroma under four headings: First, there is painful exophthalmos with secondary optic atrophy. This is one of the earliest symptoms. Heyden found this to be the earliest symptom in 31 out of 42 cases. In about one-fourth of the cases of chloroma the growth has its origin outside of the skull. Hence, exophthalmos is absent only in those cases in which the bones of the skull are not involved in the process.

The second series of symptoms are due to the growth of the chloroma in the temporal bone, causing middle ear infections, hemorrhages, tinnitus, reduced hearing and swelling and painful mastoids. These symptoms were present 25 times in the series of 42 cases. They are bilateral. According to Körner, chloroma is relatively more often met with in the external canal than any other tumor involving the ear. Disturbance of equilibrium resulting from chloromatous involvement of the static portion of the internal ear has been noted by Körner, Weinberger and others. Impaired function of the seventh nerve due to chloromatous infiltration has been repeatedly observed. Along with the ear disturbances there frequently appear chloromatous deposits under the temporal muscles, on one or both sides. Similar growths frequently occur in the nose, giving rise to hemorrhages which are sometimes fatal. In cases where the nose has been obstructed autopsies have revealed chloromatous growths in the sphenoid, ethmoid, antrum or pharyngeal vault (according to Körner, Chiari, Behring and Rosenblath). Strange to say, intracranial pressure symptoms, slowing of the pulse, vomiting, etc., have never been recorded, although growths along the venous sinus in the dura have frequently been present.

Thirdly, there is marked anemia, especially in the latter half of the disease. Many times the picture is that of a typical acute leukemia with an enormous increase in the number of white blood cells. The leukemia may appear suddenly shortly before death. (Rosenblath and Weinberger.) Coincident with this appear many large and small glands along the neck, mediastinum and abdomen. They are made up of one or more green nodules. Many times the spleen becomes swollen so that a diagnosis of leukemia is made.

The fourth point in diagnosis is the age at which the disease appears. Among 33 cases of chloroma, 28 appeared between the ages of one and twenty-five. Five cases were between the first and fourth years, eight between six an ten years. In cases of advanced age the growths are seldom found on the skull. The number of male sufferers is greatly in excess of the females.

The disease usually runs a short course. Death ensues in the great majority of cases within three to four months. The direct cause of death is hemorrhage or general marasmus.

In conclusion, I believe it is important for the specialists in head work to be familiar with this condition in order that unnecessary operations may be avoided.

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LXXVI.

CONCERNING THE QUESTION OF JUGULAR LIGATION† IN SINUS THROMBOSIS.*

By Otto M. Rott, M. D.,

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Thirty years ago Horsley[1] of London advocated the ligation† of the jugular vein in cases of infective sinus thrombosis, but gave as the indication for the procedure the presence of metastases, hoping thereby to prevent further infection.

Ten years later, when reporting two cases of infective thrombosis, C. Barck[2] of St. Louis wrote that the question upon which no unanimity of opinion has been reached, is the ligation of the jugular vein, and forthwith stated his belief that the primary ligature of the jugular vein is justified in all cases of sinus thrombosis.

Between these two extreme views, the ultraconservative view of Horsley, who waited for the appearance of metastases, and the ultraradical view of Barck, there are all sorts of opinions recorded. In 1903 Politzer[3] (p. 614) wrote that the question of ligating the internal jugular vein is not yet settled, and as late as a quarter of a century after Horsley's original recommendation, Kerrison[4] is forced to the conclusion that concerning the question—in what class of cases is the sinus operation alone—i. e., without jugular ligation or resection indicated? otologic literature throws little light.

What then are some of these divergent views? By whom held? And how justified? After critically reviewing, in the light of present knowledge, the principles upon which these various views are based, the writer will append his conclusions which seem to be justified from personal experience and a study of the literature. The various views to be discussed are:

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†The term ligation as used in this paper refers to any jugular operative interference, whether simple ligation or ligation with resection.

1. Those in favor of ligation in all cases.
2. Those opposed to ligation in all cases.
3. Those in favor of ligation only when free bleeding does not occur from the jugular end of the sinus.
4. Those in favor of ligation only when rigors and fever continue after the removal of the thrombus.
5. Those in favor of ligation only after the development of metastases.

I.—THOSE IN FAVOR OF LIGATION IN ALL CASES.

Barck[2] took this stand, claiming it was almost impossible to ascertain during the operation the true state of affairs in the bulb and sinus.

Kerrison[4] is of the same opinion and goes one step further in stating that the sinus operation itself may produce a traumatic thrombus even when no thrombus previously existed. He states his views as follows:

"Theoretically this question is easily answered by the statement that it (the sinus operation alone) is indicated in cases in which the physical evidences on opening the sinus are of a circumscribed lesion situated well above the lower end of the vertical limb. But how are we to determine such limitation? Suppose, for example, that we operate upon a case in which symptoms of periodic septic absorption have been present, and that on opening the sinus we have a free bleeding from the direction of the bulb, and a demonstrable clot toward the torcular end. Such a case would seem to present ideal conditions for the sinus operation alone. But can we be sure that a secondary infection at the bulb does not already exist, or that in the manipulation incident to the opening of the sinus, its compression below and the removal of a septic clot above, we have not sown the seed for a septic thrombosis below? Or suppose that we find absolutely no physical evidences of a clot; can we from this conclude that a nonobstructive parietal clot does not exist in the bulb? Personally I feel that when we have opened the sinus to the extent necessary to explore its lumen for the presence of a suspected clot, we have incurred the risk of producing a traumatic thrombus, even though none has previously existed. For this reason and those stated above, I believe that when we have assumed the responsibility of opening a sinus on account of symptoms of septic absorption, we should in every case further safeguard the patient by ligation or resection of the jugular vein. As to which operation should precede the other—i. e., the exploration of the sinus or the ligation or resection of the vein—ordinarily I do not believe that it greatly matters. When, however, the patient's condition is so profoundly septic and his vitality so greatly reduced that the addition of any fresh septic material to that already circulating in the blood might turn the scale unfavorably, I should say that ligation of the vein should precede the opening of the sinus. In any case, and whichever order of precedence is observed, the sinus should always be freely exposed and ready for exploration before the vein is operated upon."

To the above I would apply the author's own remarks concerning anther question (the forcing of septic material toward the torcular end from manipulation below): "These contentions while theoretically correct are not in my opinion of great practical significance." And this is stated because of the numerous instances of cure in which the sinus operation has been performed without disturbing the jugular vein. As Prof. Da Costa has once remarked, the law of probabilities must always be taken into consideration.

Politzer[3] quoted Bergmann, Forselles, Lane and Zaufal as advocating ligation of the vein before opening the sinus, but only, however, in cases in which a septic thrombosis is found after the sinus is exposed, the reason being that by ligating the vein, septic material and particles of thrombus which have been loosened by the operation are supposed to be prevented from entering the blood stream. Of course this is only partially true, because while the main channel is thus occluded, there are left collateral venous channels through which infection can be carried.

In the discussion of Dr. Whiting's paper,[6] Sheppard states that his experience leads him to approve of previous ligation of the jugular, and because more recent statistics show that there is the largest percentage of recoveries where the vein is tied before any other operative procedures are resorted to.

Lilienthal in the same discussion said the ligation of the vessel should precede any chiseling of bone or any palpation of the sinus or the soft parts about it, so that in the event of the dislodging of septic material from the thrombus during the necessary operative manipulations, the door of entrance to the circulation might be closed in advance.

Jones[15] sent a questionnaire to 100 of the leading otologists of the country, and of the 19 who responded 13 favor jugular ligation in every case of lateral sinus thrombosis.

Without attempting to make an exhaustive review of the literature, I believe sufficient authorities have been quoted to make it incumbent on anyone opposing the ligation in all cases to fortify himself well with facts if he hopes to have his views justified.

These facts I now shall attempt to present:

II.—THOSE OPPOSED TO LIGATION IN ALL CASES.

When such authorities as Politzer, Körner and Bezold oppose the ligation in all cases, we must at least admit that there are two sides to this as to every other question.

Politzer[3] writes as follows:

"The favorable results after ligation of the internal jugular vein quoted in literature cannot be taken as being due to this operation, as recovery often occurs after cleaning out the sinus without ligation of the vein. That, in spite of ligation, septic matter may enter the blood current from the infective focus in the sinus through collateral venous channels is beyond all doubt. A condition which also contraindicates ligation of the jugular vein before opening the sinus is incomplete thrombosis; in such cases ligation of the internal jugular vein causes the current of blood to flow backwards towards the venous blood vessels of the skull, by which the superior and inferior petrosal sinuses, as well as the larger venous vessels of the cranial cavity may become infected." (Jansen, Brieger.)

Allport[5] does not believe that the favorable reports of jugular ligation in sinus thrombosis need necessarily be attributed to the ligation, quoting Körner's excellent results without ligation, to which reference will again be made. Allport writes:

"I am convinced that excision of the jugular is not an operation which should be undertaken hastily, as grave circulatory and other disturbances are liable to ensue, and other methods of relief should first be tried, unless the patient's condition is very urgent. The literature furnishes many instances where sudden optic neuritis, edema of the brain, with hemorrhages and softening, thrombosis of other cerebral sinuses, etc., have followed jugular ligation, and it should not be forgotten that a small and insufficient jugular on the other side, totally unable to assume double duty, may be present and precipitate most unfortunate results. As a deduction from these observations, Eagleton urges that in cases of sinus thrombosis with optic neuritis, it should be concluded that the return venous flow is already seriously obstructed and that great caution should be observed in adding to such conditions by ligation."

That ligation of the internal jugular vein is not the simple procedure many would have us believe is also evidenced by the report of Stolz,[14] who adds a fourth case to the three he has found on record in which ligation of the internal jugular vein had fatal consequences. Linser found evidences of insufficiency of this vein in three per cent of 1,000 skulls examined, and this was five times more frequent on the left side than on the right.

Returning now to Körner's[10] work on 314 cases, this author opened the sinus without ligating the jugular vein in 132 cases, of which 77, or 58.3 per cent, were cured. The jugular vein was ligated before opening the sinus in 94 cases, 56 of them, or 59.6 per cent, were cured. The jugular vein was ligated after opening the sinus in 69 cases, 38 of them, or 55.9 per cent, were cured. From this analysis, Körner draws the following conclusion: "That it is best to adapt the method and extent of the operation to the finding in each case. To ligate the jugular vein in all early and late operations for thrombophlebitis of the sinus as a matter of principle seems under all circumstances not justified according to the number of recoveries without ligation."

Bezold[11] is convinced that the favorable results do not depend so much upon a certain method of operation as upon an early interference, and he quotes in support of his contention Toubert's statistical compilation of 200 operated cases of sinus thrombosis.

Toubert[12] operated upon 120 of the 200 cases within the first week after the appearance of endocranial symptoms, with 75 per cent recoveries and 25 per cent deaths. The other 80 cases could be operated upon only after the first week, and of these only 37.5 per cent recovered, while 62.5 per cent died.

After analyzing 50 case reports, Jones[15] has discovered that the mortality following sinus operation is as great where there is routine ligation of the jugular as it is where the ligation is reserved for the severe cases. For instance, in the 35 cases where the vein was either ligated or resected five died, 14 2/7 percent, while in the 15 cases where the jugular vein was not treated surgically two died, or 13 1/3 per cent. This, as you see, coincides very well with the statistics of Körner.[10]

Crockett[16] reported 60 cases from different operators in which the vein was ligated before or immediately after opening the sinus. Nine cases died, making the death rate 15 per cent.

If any further justification is need for opposing ligation in all cases, that is really supplied by Day's[13] report of a spontaneous cure of six cases of unrecognized sinus thrombosis which were accidentally discovered during operation, out of a total of 45 cases of thrombosis. In other words, 13½ per cent of this author's cases healed spontaneously.

Believing now that there is a justification for anyone opposing jugular ligation in all cases of sinus thrombosis, there still remains the necessity of stating, in what elective cases jugular ligation is indicated. But first we shall continue our original intention of discussing the other views previously mentioned, and in passing it may be mentioned that the authors to be quoted in this next group stand side by side with those mentioned as opposing ligation in all cases.

III.—THOSE IN FAVOR OF LIGATION ONLY WHEN FREE BLEEDING DOES NOT OCCUR FROM THE JUGULAR END OF THE SINUS.

Of the writers advocating this procedure, may be mentioned Allport,[5] Whiting,[6] Macewan (quoted by Politzer[3]), Loeb,[7] Ballenger,[8] Phillips[9] and Bezold.[11] Phillips, however, makes some exceptions and ligates (1) if clot is undergoing disintegration, (2) should patient's previous symptoms indicate profound sepsis, (3) or if there is marked tenderness and infiltration along the course of the vein with enlargement of the cervical glands.

In the absence of any of the graver indications for jugular ligation, such as metastases and physical evidences of thrombosis in the jugular vein, I think this view favoring the ligation only when free bleeding fails to occur from the jugular end of the sinus, offers the most rational indication for operative interference on the jugular vein in the presence of sinus thrombosis that we possess.

IV.—THOSE IN FAVOR OF LIGATION WHEN RIGORS AND FEVER CONTINUE AFTER THE REMOVAL OF THE THROMBUS.

Politzer,[3] and Jansen quoted by Politzer, advocate this procedure, and its rationale appeals to me in those cases that have escaped the ligation at the primary operation because free bleeding was obtained from the jugular end of the sinus. This indication will take care of those few cases on which the advocates of ligation in every case base their views, namely: Those cases which are infected in the bulb and vein in spite of the fact that free bleeding occurred following the curettement of the jugular end of the sinus. But why judge all by the few? We grant that free bleeding from the jugular end of the sinus does not necessarily prove that there is no infection in the bulb and vein, but we do not grant the point that a possibility is a probability. We contend, and statistics prove our contention, that the majority of cases from which free bleeding has occurred from the jugular end of the sinus, are safe cases for the jugular vein to be left undisturbed.

V.—THOSE IN FAVOR OF LIGATION ONLY AFTER THE DEVELOPMENT OF METASTASES.

Horsley (quoted by Politzer,[3] Allport[5] and Barck[2]) was the exponent of this procedure, but I doubt very much if anyone can now be found rash enough to advocate delay to such a degree. It would be safer by far to ligate in all cases than to ligate only at this terminal stage, though, of course, an occasional cure will result, but at the price of many more than an occasional death.

From a consideration of this question from the various viewpoints thus hurriedly presented, I think we are justified in accepting Körner's dictum "that it is best to adapt the method and extent of the operation to the finding in each case."

Personally I can see no more justification in the practice of ligating all cases than in the practice of operating upon all acute mastoid cases or of enucleating all tonsils. Let each case be a law unto itself, and until some indication other than sinus thrombosis exists let us not increase shock and lengthen the operative procedure unjustifiably.

In conclusion, may I be permitted to present the indications for jugular ligation in sinus thrombosis which I feel to be justified, from the short study that I have thus far made of this problem:

1. In the presence of metastases or when the vein presents physical evidences of thrombosis.

2. When free bleeding fails to occur from the jugular end, even though there are no metastases or physical evidences of thrombosis in the vein.

3. Finally, even though free bleeding has occurred from the jugular end, if rigors and fever continue or reappear after the sinus operation.

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LXXVII.

LATERAL SINUS THROMBOSIS, WITH REPORT OF SEVEN CASES.*

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One of the most disturbing complications of mastoiditis is furnished by lateral sinus thrombosis. This complication, always a possibility, generally gives sufficient worrk to the attending otologist so that he may not find life too motonomous, at least just at that time. With this condition threatened there is usually considerable food for thought. Even with the diagnosis established and the seemingly proper course of procedure followed, there is still generally sufficient cause for concern, until undoubted convalescence is reached. Although Zaufal, in 1880, first suggested opening the sinus in a case of thrombosis, until Ballance,[1] in 1890, advocated the ligation of the internal jugular vein and shutting off the infection from the general circulation, this condition was indeed considered of the most serious nature, if not of necessarily fatal consequence. Much has been written on this disease, a great deal of which has been of inestimable value, but it may not be amiss to report the following series of cases occurring in the Oto-Laryngological Service at U. S. A. General Hospital No. 14, Fort Oglethorpe, Ga., during the year 1917-18.

Lateral sinus thrombosis may generally be considered as a complication of mastoiditis, either acute or chronic, although a number of cases of primary infection of the jugular bulb and sinus have been reported by McKernan[2 3] and others. These accompanied an acute otitis media, the pathway being directly from the middle ear to the bulb, either by dehiscence in the bony wall or by means of small communicating veins and lymphatics, or by direct absorption of bone. Other cases have been reported where there was no evident middle ear disease and the sinus was found filled with pus at operation. Sauer reported such a case in 1910. However, it is quite possible that there had been some otitis media at some time previously, if unrecognized by the patient at the time.

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The ratio of sinus thrombosis to mastoiditis is hard to determine. Figures vary a great deal, but there can hardly be any doubt that this complication is fairly frequent. Downey[4] reports five cases out of a series of 79 acute mastoids. Gerber[5] reports 25 in a series of 524. Welty[6] reports a series of 100 acute mastoids with only 3 cases of sinus thrombosis. Out of a series of 497 cases of mastoiditis at the Massachusetts Charitable Eye and Ear Infirmary during 1917 there were 19 cases of lateral sinus thrombosis. The seven cases here reported occurred in a series of 168 cases of acute mastoiditis at General Hospital No. 14.

Braun[7] in his work on the pathology of sinus thrombosis says that thrombosis of the lateral sinus resulting from middle ear and mastoid disease may occur in the following ways: "1. The inner table of the mastoid over the sinus may be diseased and an abscess formed between the sinus and the inner table. This results in an inflammation of the true sinus wall which eventually leads to the formation of a thrombus within the sinus. 2. The inner table over the sinus may be diseased and cause an extension of the inflammatory process to the sinus wall without the intermediation of a perisinus abscess. The phlebitis results in a thrombus formation. 3. A thrombus may form in one of the smaller veins of the mastoid and extend into the lateral sinus."

The usual course of events is necrosis of the sinus wall and destructive changes in the endothelial lining . Bacteria in the vessel wall set free toxins which pass into the blood stream. There is also an increase in the agglutinability of the blood platelets and an increased coagulability of the plasma which, with the destruction of the intima, make up the main factors in sinus thrombosis. Braun found that the bacteria were present mostly in the peripheral portions of the thrombus and that the younger thrombi contained few, if any, bacteria. This seems to indicate that the thrombus was formed before the bacteria themselves entered the blood stream. Thrombi may be either obliterating or parietal. Probably all start as parietal, becoming obliterating after a variable time. It would seem that the thrombus which remains parietal for considerable time is far more dangerous to the patient than the obliterating type. A parietal thrombus is continually washed by the flowing blood stream, and, if of sufficient duration to have accumulated considerable bacteria, must needs be more of a menace, because of the septic material being swept into the general circulation, than in the case of the obliterating thrombus.

The underlying causes of sinus thrombosis may generally be considered under four heads:

1. The virulence of the infection.
2. The resistance of the individual.
3. Delayed mastoid operation.
4. Incomplete mastoid operation.

The distinction between the first two is often hard to determine, for they overlap each other with great frequency. Neither requires much comment. As an example of the first, we have the fulminating mastoiditis, usually streptococcic in its bacteriology, in which we may have operated as early as the third day after the onset of the otitis, and yet the picture disclosed at operation made our work seem tardy. Then we have the type of case where the mastoiditis is a complication of another disease which has sapped the patient's vitality. His resistance has been immeasurably lowered before the onset of mastoiditis. In the series upon which this article is based mastoiditis was a frequent complication following measles or pneumonia, and consequently low resistance on the part of the patient was frequently encountered.

Delayed mastoid operation is a frequent cause of sinus complication. Often this error is excusable. It may be impossible to make a diagnosis because of masked signs and symptoms, or a coincident disease. Furunculosis of the canal may prove a misleading factor and render the diagnosis difficult. An abnormally thick cortex may retard the development of inflammatory signs on the surface of the mastoid, and unless there be sufficient canal and middle ear signs present, cause delay in making a diagnosis of suppurative mastoiditis. As the result of coincident disease, the patient's condition may be such that it is advisable to delay operation to the limit, even running the chance of complications.

Too frequently is incomplete mastoid operation the cause of sinus thrombosis and this does appear inexcusable. Far too often is a secondary operation required in order to insure healing after a simple mastoidectomy, and far too often does this period of healing drag out to unnecessary length because of incomplete exenteration of the mastoid at first operation. Thorough surgery would eliminate a certain number of cases of sinus thrombosis. The pathologic process in acute mastoiditis, as shown by Beck,[8] is by one of two ways: cell route, or confluent; vascular, or osteophlebitic. Especially in the case of the former does incomplete removal of the cellular or diploetic areas tend to a continuation of the process until we get necrosis of the sinus wall and consequent blood stream infection. Disregard of the cellular area just internal to the prominence of the digastric fossa and in the angle between the floor of the middle fossa and the knee of the sinus is altogether too common. These two areas are favorite sites in which to find a perisinus abscess. Cells posterior to the sinus are often overlooked and may prove potential factors in subsequent sinus complication. Too frequently a mastoidectomy is like sweeping a room but neglecting the corners. Earlier and more complete mastoid surgery would avoid many sinus thromboses.

The clinical picture of sinus thrombosis is practically that of general sepsis with frequently certain localizing signs. The picture may vary a great deal, making diagnosis increasingly difficult. Signs that are almost diagnostic when present, prove nothing by their absence. In the typical case we have a septic temperature rising to 10 or above, followed by a remission to normal or below, with daily repetitions. McKernon[9] considers temperature the most important symptom. Chills are frequently seen, following which there is usually profuse sweating and rise of temperature. McKernon gives the proportion of cases showing chills as 50 per cent. When present this symptom is very diagnostic, provided malaria has been ruled out. The pulse and respiration are usually proportionate in their increase to the temperature. With a disproportionately lowered pulse rate we must consider the possibility of intracranial complications. We may have nausea and vomiting. The neck may be tender and palpation over the internal jugular may reveal a cordlike thickening. We may find edema in the region of the mastoid foramen and the emissary vein. Greisenger's sign, based upon the unequal filling of both jugular veins upon compression is rarely demonstrable. A high leucocytosis is to be expected, with the differential count showing a relative increase in the number of polymorphonuclear leucocytes. Frequently we may find a blurring of the fundi, although not generally seen in the earliest ages. A positive blood culture is almost diagnostic, but when negative means nothing. According to Libman,[10] all cases of sinus thrombosis show a bacteremia at some time in their course. Consequently the value of the blood culture often depends upon the psychologic moment of its being taken. The culture may be taken before the bacteremia has been established, or after it has spontaneously disappeared, or the bactericidal power of the blood may be increased so as to eliminate the organisms.

All these signs make diagnosis easy, provided sufficient of them be present. An added help is the history of a perisinus abscess or a necrotic plate found at the preceding mastoid operation. But how often it is that the picture lacks most of these signs, requiring us to base our diagnosis on only one or two of them, plus a general conception of the case and surgical judgment.

The possible end results of sinus thrombosis according to Braun[7] are: "1. The patient dies of general sepsis before the clot breaks down. 2. The clot breaks down in the center and the abscess finally breaks through the true wall of the sinus so that the abscess within the sinus communicates with the perisinus abscess. 3. The pus within the sinus breaks through the visceral wall of the sinus and produces a cerebellar abscess or meningitis. 4. The thrombus organizes and results in obliteration of the sinus. 5. Part or all of the thrombus becomes absorbed, resulting in the recanalization of the sinus." The thrombus may extend from the sinus into some of the pial and cerebral veins and result in the occurrence of spots of hemorrhagic softening of the brain. Metastatic foci in the lungs, from the breaking off of fragments of the thrombus which are carried into the pulmonary capillaries, and foci in the joints, muscles and subcutaneous tissues, resulting from the bacteremia, may develop."

Many of these cases take care of themselves spontaneously without any operative interference, but almost without exception they run a stormy course. Undoubtedly there are many cases of sinus thrombosis which are never diagnosed as such. Day[11] reports six such cases accidentally discovered during subsequent mastoid operation. However, it is putting too much responsibility upon nature to allow this course to be pursued if possible to do otherwise. Interference as early as possible with the establishing of the diagnosis offers the best hope. The difficulty usually arises from the inability to make the diagnosis early enough. As this rests upon the clinical picture of general sepsis of a variable degree, there may be many difficulties presented. We may have a double mastoiditis and be unable to convict either side as the one guilty of the thrombosis. The delay because of this may prove very detrimental, as in Case 1 of this series. There we had a double mastoiditis, each side showing a perisinus abscess. It was two days after the patient had his initial chill before we were able to pin the diagnosis of sinus thrombosis upon the left side. The picture may be very atypical, with an insufficient number of the classical signs present to make a diagnosis. We may have to wait for the subsequent development of these signs to confirm what we may have already strongly suspected. Case 7 illustrates this. We may be confronted by the presence of some coincident disease which also gives a septic picture. Pulmonary complications or empyema may detract our attention from the sinus.

As soon as a diagnosis of sinus infection is made, operative interference should be resorted to. The earlier the operation follows the involvement of the vein, the more the patient will be spared. We are usually handicapped by difficulty in making a diagnosis and pay for the delay in a stormy post-operative course, or worse. Dench[12] considered that even in the absence of tenderness in the neck and other local signs, with an increasing remittent temperature and an almost certain knowledge of an infective sinus, it was wrong to delay operative interference.

If we must wait for these local signs, we are bound to have a prolonged course of sepsis. The difficulty is that we operate for the most part on signs caused by the general septic condition. If we can make our diagnosis upon its initial appearance and operate immediately we will gain a great deal. For instance, it is a mistake to wait for the appearance of chills if we have other sufficient data to proceed upon.

Authorities differ as to the proper course of treatment. Since Ballance first advocated ligation there have been differences of opinion as to the correct surgical procedure. At present there seems to be a division of opinion between ligation of the vein and complete resection. The operative work on the sinus proper is pretty much the same for both groups. The same method of procedure in regard to the vein may not be applicable to every case. McKernon,[9] Dench[12] and Richards[13] rather tend to resection, at least where there is any particle of doubt. On the other hand, the simple ligation can be performed in a very few minutes, causes very little trauma and very little shock to the patient, as compared to the more radical method. Tobey,[14] in a series of over two hundred cases, has found it necessary to employ resection in only two of them. If the horizontal crease incision is used the later cosmetic results are very gratifying. On the cases in this series on which this incision was used the neck scars were hardly discernible a few months afterwards. However, as Sauer[15] has said, after discussing the various methods of procedure, the results do not depend on any certain method, but upon how early the case is operated upon. For the ligation to prove satisfactory, in comparison to resection, it must be done early. In such cases it seems almost ideal. The ligation should be performed before there is any interference with the contents of the sinus, with the chance of sending infected material down the vein. If the mastoid has already been operated upon and we feel absolutely certain of the diagnosis—that the picture is not simulated by a perisinus or extradural abscess—we may start the operation in the neck with a perfectly fresh field and then after the jugular has been ligated and the wound sutured proceed to the necessarily infected mastoid region and the sinus.

In the series here reported all were operated upon as soon as we could establish the diagnosis. However, looking backward, it would seem that sinus operation was unduly delayed in almost every case. There is no doubt that each case would have done much better with earlier interference. This is a case of where "hindsight is better than foresight." Possibly, at the time some of these cases were operated upon, resection would have been preferable to the course pursued. It is a debatable point. Considering the condition at the time and the amount of shock to the patient, the simpler method seemed the better. It would seem that the mistakes made were really on the time of operating and not so much on the method.

The operation performed in all, except Cases 4 and 7, was the ligation, following the method of Dr. G. L. Tobey. With the exception of Nos. 1 and 2, they were all performed under nitrous oxid and oxygen anesthesia with most gratifying results. And right here it is not inappropriate to mention the very satisfactory use of this anesthetic. Shock was reduced to the minimum and the patient recovered consciousness before the final dressings were applied. In such cases as these, this was of great importance. Truly it seems the anesthesia par excellence for this type of case.

After usual preparation of the field, the head was turned toward the opposite shoulder and a sandbag placed under the neck to put it on the stretch. A small horizontal incision, not over one and a half inches long, was made in a deep crease of the neck in the superior carotid triangle, at the level of the thyroid, just anterior to the border of the sternomastoid muscle. The incision was carried through the platysma, retractors were introduced, Mayo scissors were substituted for the scalpel, and dissection made vertically just anterior to the sternomastoid. The carotid sheath was exposed, entered, and the internal jugular vein isolated from the carotid and the pneumogastric nerve. A double ligature of chromic catgut was placed around the vein, separated about a half inch and tied and the wound closed. Now the mastoid wound was reopened and the sinus widely uncovered. The upper and lower ends were compressed by gauze plugs inserted between the vein and the inner table. The sinus was incised, contents evacuated, and a large portion of the external wall removed, to a point beyond the thrombus. After free bleeding had been obtained from above and below, the sinus was packed with iodoform gauze and the wound partially closed with silkworm gut. The gauze in the sinus was left, on an average of five days. The horizontal crease incision gives ample exposure if properly utilized and with proper retraction. The cosmetic result afterwards, while of secondary importance to conserving life, should not be overlooked. In Case 4 the operation was the same except for the neck incision, which was considerably longer and vertical, parallel to the anterior border of the sternomastoid. Case 7 showed considerable swelling and inflammatory reaction in the neck, and the long vertical incision was required. This inflammatory mass was removed and the vein resected for a considerable extent.

In the series here reported Case 4 was Dr. W. E. Sauer's and his courtesy is incorporated herein. In Cases 5 and 7 the initial operative work was performed by other members of the hospital staff, and the sinus operation and later care were by the writer. Cases 1, 2, 3 and 6 were the writer's throughout.

Case 1.—The patient was admitted to the hospital April 3, 1918, with a diagnosis of measles. He was a young white man, twenty-one years old, of slight build. Complicating his measles was a severe bronchitis. Eight days after entrance he developed an acute suppurative otitis media on the right. The membrana tympani was incised under local anesthesia. Two days later he developed a similar condition on the left. An incision was early performed. Both ears gradually quieted down and seemed to be convalescent in a few days.

April 25th. There was exacerbation of the otitis media on the right side requiring another incision. X-ray examination at this time showed large pneumatic mastoids, the cells apparently clear. From this time on there was considerable discharge from both ears, but otherwise than this the patient seemed to be very well and was able to be out of bed.

May 11th. There was increased mucopurulent discharge from the left middle ear.

May 12th. There was profuse discharge from the left ear, the superoposterior canal wall was slightly flattened, the membrana tympani red and thickened, and there was slight mastoid tenderness and edema. The white blood count at this time was 11,800. Differential: small mononuclears, 27; large mononuclears, 5; transitional, 1; polymorphonuclears, 68.

May 12th. Operation. Left simple mastoid. Ether anesthesia. Usual incision—cortex bleeding—large pneumatic mastoid with free pus and considerable destruction of the cell walls, disclosing a perisius abscess. The mastoid was thoroughly exenterated and the antrum opened, lightly packed with iodoform gauze and the wound partially closed with silkworm gut. He reacted well from the operation and seemed somewhat improved the next day, but the following evening his temperature rose to 103.8°.

May 14th. He had a chill. The wound was clean, the middle ear dry, and there was no edema over the region of the emissary vein nor was there any tenderness in the neck. His white blood count was 9,200. The right ear showed a profuse mucopurulent discharge, and there was slight flattening of the superior canal wall. There was no mastoid tenderness. While we felt certain that this was a case of sinus thrombosis we did not dare to consider the left sinus as the affected one without exploration on the right.

May 14th. Operation. Right simple mastoid. Ether anesthesia. Usual incision—cortex bleeding—free pus and cell walls considerably broken down—perisinus abscess similar to the left. Mastoid exenterated, wound lightly packed with iodoform gauze, partially closed with silkworm gut. We were unable at this point to decide which sinus was affected.

May 15th. Temperature was 105°. White blood count, 12,800. The next day the white blood count was 17,600. Differential count: small mononuclears, 1; large mononuclears, 6; polymorphonuclears, 93. Packing was removed from the left wound and a small amount of pus seen on the sinus wall, which was pulsating. The right wound was clean and the middle ear about dry. It was deemed necessary to interfere and the evidence pointed toward the left side.

May 16th. Operation. Ligation of left internal jugular vein. Ether anesthesia. The internal jugular was isolated and ligated in the method above mentioned. The sinus was uncovered and incised. A good sized thrombus was found and removed. A portion of the anterior wall was removed, the sinus curetted and iodoform gauze introduced.

Report of blood culture after forty-eight hours' growth was negative. Two days later a metastatic involvement of a metacarpal joint was noted. Packing was removed from the right mastoid wound.

May 20th. Temperature 103°; general condition seemed good.

May 21st. Medical consultation resulted in a diagnosis of bilateral bronchopneumonia. Blood culture still showed no growth.

May 24th. Both middle ears were dry and the wounds clean.

May 27th. Left pleural cavity aspirated and streptococci found in culture from the fluid. Medical consultant advised use of antistreptococcic serum. Considerable reaction followed its administration. After desensitization, 100 cc. of antistreptococcic serum with 150 cc. saline was given intravenously. This was repeated the next day. There was marked reaction following the use of the serum. The left arm became greatly swollen and cyanotic, with purpuric areas reaching to the shoulder. While the neck and mastoid wounds were perfectly clean and the middle ear was dry, patient seemed extremely sick. The temperature was about 103° each evening, and he was the picture of general sepsis. Further doses of antistreptococcic serum were given May 29th, 30th and 31st.

May 31st. Three hundred cc. of straw colored fluid removed from left pleural cavity. The temperature that evening was 99°. His general condition was very weak and stimulation was required.

June 1st. Five hundred and ten cc. turbid straw colored fluid removed from the left pleural cavity.

June 2d. Fifteen cc. antistreptococcic given intravenously. This was discontinued, as patient became very much distressed and his respiration and pulse very rapid during administration.

June 6th. He complained of pain in his left knee, and examination showed the presence of fluid in the joint. The same day 35 cc. of turbid straw colored fluid was removed from left pleural cavity. The patient gradually became weaker—cerebration was impaired and he died on June 13th.

No autopsy was obtained. The factors in this case seemed to be a markedly virulent infection, plus the nonresistance of the individual, worn down by his long illness. Added to this we have the delay of two days in ligating the jugular because of inability to diagnose the affected side. This undoubtedly was of extreme importance. Also the use of antistreptococcic serum undoubtedly was of no benefit but, on the contrary, it seemed to us to have had a markedly detrimental effect. Each dose seemed to lower his resistance.

Case 2.*—Patient was admitted to the hospital April 20, 1918, complaining of pain in the right ear. Age, twenty-one years. Family history negative. Past history: mumps, measles and whooping cough in childhood; no previous ear trouble. He had had severe pain in the right ear, following a severe cold, for two days preceding admission. Examination showed a right suppurative otitis media. There was no mastoid edema, but he was quite tender over the tip. Membrana tympani was immediately incised, resulting in a serosanguinous discharge and relief of pain. Tenderness over the mastoid persisted in decreasing degree for two days and then subsided. On the tenth day the ear was dry. On the twelfth day the temperature rose to 104°. The ear was apparently convalescent. Examination of the throat showed an acute follicular tonsillitis. This subsided in about four days. On the nineteenth day after admission, he developed an exacerbation of his otitis media requiring a second incision. Because of quarantine of the ward on account of scralet fever it was impossible to have a radiograph taken at this time.

On May 10th, twenty days after admission, he developed a temperature of 103°. The ear was discharging freely, there was no mastoid tenderness or edema, but considerable preauricular swelling. Following a consultation with the medical service, patient was put under observation for mumps. Next day's temperature was 100.°

May 12th, twenty-two days after onset, there was profuse discharge from the middle ear, and the superior canal wall showed a distinct flattening. The membrana tympani was red and bulging, the mastoid periosteum felt thickened, and there was slight tenderness over the tip. Temperature, 102.2°. Operation immediately performed. Ether anesthsia. Usual incision—cortex bleeding—large pneumatic mastoid with cells broken down and containing free pus, perisinus abscess; antrum opened and exenterated; iodoform gauze inserted and wound partially closed with silkworm gut.

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*Abstract from report of case in Annals of Otology, Rhinology and Laryngology, Vol. XXVIII, No. 1. March, 1919.

Patient followed an uneventful course for four days, when he had a severe chill, following which the temperature went to 104. Packing was removed from the mastoid, and the sinus seemed to be pulsating. White blood count, 6,400. Differential: polymorphonuclears, 93; small mononuclears, 3; large mononuclears, 2; transitional, 2. Blood culture showed no growth. Next day patient seemed to be better, middle ear was dry and there were no chills. Temperature that evening, 102°; white blood count, 9,600.

May 18th, six days after operation, temperature was normal in the morning and the patient felt fine. At 4 p. m. he had a spontaneous hemorrhage from the lateral sinus, which was easily controlled by packing. Temperature that evening, 101.6°. Next day patient had rather a septic look, and temperature rose to 104.4°. White blood count, 16,800. Differential; polymorphonuclears, 72; small mononuclears, 11; large mononuclears, 7.

May 20th. Patient had a second chill, following which the temperature went to 103°. White blood count, 13,000. Differential: Polymorphonuclears, 85; small mononuclears, 5; large mononuclears, 10. Operation immediately performed under ether anesthesia. Usual ligation of the internal jugular vein and drainage of the sinus. No obliterating thrombus was found. Patient reacted well from operation.

Patient ran a septic course for about three weeks. He had some nausea and vomiting and several subsequent chills. The area under the neck incision became swollen and fluctuant, necessitating the reopening of the wound. Considerable pus was evacuated. We felt this was due to infection from a buried catgut suture, but it may have been a result of the phlebitis.

May 25th. Blood culture showed a growth of streptococcus hemolyticus.

May 26th. He complained of pain in the right shoulder joint. The next day there was another spontaneous hemorrhage from the sinus, easily controlled by packing.

June 2d. There was a third hemorrhage, but less in degree. He still complained of pain in the right shoulder joint and on June 6th 8 cc. of serosanguinous fluid was aspirated from the same. There was no growth from this on culture.

June 16th. Fundi were examined by Lieut. Col. de Schweinitz. "Right disc swollen 2.5 D., hemorrhage above disc. Left disc swollen 3.5 D. Probably toxic condition."

From this time on the patient's course was uneventful. The temperature remained normal and he was up and about. Subsequent examination of the fundi showed a gradual subsiding of the discs.

July 8th. Vision both eyes, 20/30. Hearing normal. This case agrees with the pathology of sinus thrombosis as described by Uffenorde.[16] The hemorrhages resulted from necrosis of the vessel wall. Lewis[17] describes a somewhat similar case. If ligation had been performed at the time of the first hemorrhage instead of waiting for the subsequent chills, undoubtedly the patient would have been spared a great deal.

Case 3.—Patient was admitted to the hospital January 29, 1919. Age, twenty-six years. Former occupation, farmer. Family history, negative. Past history: measles, mumps and whooping cough in childhood, typhoid fever ten years ago, lobar pneumonia nine years ago, influenza October, 1918, since which time he had been suffering from a lung condition which had been diagnosed as chronic tuberculosis. He was admitted to the hospital from a hospital train, en route to a tuberculosis hospital, complaining of pain in his right ear. Diagnosis: right acute suppurative otitis media. He was poorly developed and ill nourished and seemed ill and very weak. His right ear had been discharging one day. Examination of his lungs showed râles, diagnosed by the medical service as tubercular. There was a profuse discharge from the middle ear, the canal was negative and the membrana tympani red and bulging with a round central perforation. There was some tenderness over the tip of the mastoid. Membrana tympani incised. The next day the tenderness had disappeared. He ran an uneventful course for the next seven days, when the discharge became increased in amount, the landmarks of the middle ear became lost, and the mastoid again became tender. The canal remained negative. X-ray examination resulted in a very poor plate. The cell walls were invisible, and it was reported as resembling a sclerotic mastoid. Temperature was normal. Diagnosis of acute mastoiditis made.

January 18th. Operation. Right simple mastoid. Nitrous oxid and oxygen anesthesia. Usual incision; thick cortex, rather small diploetic mastoid, partially broken down and with free pus. Perisinus abscess. Sinus found forward just behind antrum and showing granulations on its wall. Antrum well opened and mastoid exenterated. Iodoform gauze inserted in cavity—wound partially closed with silkworm gut.

January 20th. Temperature rose to 104.2 in the afternoon. White blood count, 22,000. Polymorphonuclear leucocytes, 81. No chills. Slight discharge from the middle ear. Wound clean.

January 21st. Temperature, 102° a. m., 102.6° p. m.

January 22d. Temperature, 102° a. m., 103.6° p. m. White blood count, 24,000. Polymorphonuclear leucocytes, 82. There were no chills, no localizing signs in the neck, or edema over the emissary vein. There was slight discharge from the middle ear. The picture was complicated by the obvious pulmonary condition. Although repeated consultations were held it was impossible to get a positive medical opinion as to whether the lungs were responsible for the temperature or not. Examination of the fundi was negaive. White blood count January 23d showed a decrease of 10,000. Polymorphonuclear leucocytes, 79. Blood cultures negative.

He continued a septic course until January 25th, when he had a chill, following which his temperature ascended to 104.4°. White blood count still 10,000. Polymorphonuclear leucocytes, 68. Report of blood culture after forty-eight hours' growth showed streptococci. At this time we were more or less embarrassed by delay in obtaining laboratory reports promptly. Diagnosis of sinus thrombosis made. Operation immediately performed.

Operation: Nitrous oxid and oxygen anesthesia. Internal jugular vein ligated. Mastoid reopened and sinus widely exposed. A small button of exuberant granulations was seen on its anterior wall. Sinus opened and a portion of wall excised. No obliteration thrombus found.

The patient ran the usual septic course for the next seven days, during which time several intravenous salines were given in an effort to combat the infection already present in his blood stream. January 28th. White blood count, 22,000.

February 2d. There was an area of redness and puffy swelling with line of demarcation on the right side of his face. This was diagnosed as erysipelas, and he was put in the isolation ward where he ran the usual course of this infection.

February 7th. His temperature returned to normal, and his subsequent course was one of uneventful convalescence. Discharged from the hospital April 25th with his general condition greatly improved.

The factors in this case are the low resistance in a tubercular individual and the delay in ligating the jugular. The condition of the lungs and the possibility of their accounting for the sepsis due to the sinus infection held up our diagnosis. Earlier ligation before the advent of the chills would have been beneficial.

Case 4.—The patient was a young man, aged twenty-four years. Admitted to the hospital October 12, 1918, with a diagnosis of bilateral acute suppurative otitis media. Family history negative. Past history, usual diseases of childhood and a right otitis media at the age of five. Present history: Five days before admission had pain in both ears, followed by discharge the next day. Examination of the ears on admission showed slight thin discharge from both middle ears and canals negative. Membrana tympani red and bulging with a small round perforation in each. Both membrana tympani were incised to insure better drainage.

October 16th. A second incision of the right drum was required.

October 17th. Right superior canal wall was flattened, the drum boggy and discharge pulsating; mastoid area showed slight edema and some tenderness; similar condition on the left side. Operation: Double simple mastoid. Nitrous oxid and oxygen anesthesia. Thick cortex on both sides, both antra filled with pus; in the right there was some pus in the cells but none on the left. Uneventful course until October 28th, eleven days after operation, when his temperature rose to 103°. Both middle ears were dry at this time and the wounds were clean.

October 30th. Complained of some stiffness of the muscles of the neck, but there was no rigidity. Temperature had returned to normal. Examination of the fundi showed slight hyperemia of both discs.

November 3d. There was slight discharge from the right ear.

November 5th. Temperature rose to 102°, and patient complained of being chilly—no evidence of definite septic chill. Reflexes negative. Slightly tender over right jugular vein. White blood count, 14,500. Differential: Polymorphonuclears, 76; small mononuclears, 20; large, 2; transitional, 2.

November 7th. Complained of pain in right zygomatic region.

November 8th. Temperature, 103°; pulse, 102. Lumbar puncture performed; fluid clear and under very slight pressure; examination of fluid negative. Neurologic examination negative. Patient ran a slightly septic course for the next three days.

November 10th. Fundus examination disclosed hyperemia of the discs, the same as in previous examination, but considerably more venous engorgement. Area over right jugular vein quite tender. White blood count, 17,000; polymorphonuclears, 86; small, 6; large, 8. Blood culture showed no growth. Diagnosis of sinus thrombosis was based upon the patient's septic appearance, temperature and the tenderness in the neck and fundus examination.

November 10th. Operation. Nitrous oxid and oxygen anesthesia. Mastoid wound reopened and granulations removed from cavity; sinus exposed from the knee to the bulb; wall appeared necrotic at lower portion and pus was seen coming from the region of the jugular fossa. Wound temperately packed with iodoform gauze and internal jugular vein ligated. Sinus was then incised and a portion of external wall removed, but no obliterating thrombus found. Sinus was packed with iodoform gauze after free bleeding had been established from above and below, and the wound patrially closed with silkworm gut.

Patient seemed to be somewhat better the next day. Temperature continued high at night for about five days, after which it gradually came down to normal.

November 13th. Area of swelling was noted just below the mastoid tip, at the angle of the jaw, which subsided in three days.

November 21st. Swelling noted again, but this time farther downward in the region of the jugular incision. Next day a distinct fluctuation could be made out over this area, and the incision was reopened under nitrous oxid and oxygen anesthesia, and a considerable quantity of pus evacuated, just anterior to the sternomastoid muscle. Iodoform gauze drain. This was removed in four days and the wound was allowed to heal.

November 24th. Examination of fundi showed the discs less hazy, vessels about normal in size. The right mastoid wound was healed December 22d; left, December 31st, and the patient restored to duty January 2, 1919.

One of the main factors of this case was the virulence of the infection. No perisinus abscess was found at the time of the mastoid operation, the plate covering the sinus apparently being healthy. At the second operation this was found softened with apparent necrosis of the vessel wall. The absence of well defined chills and the negative blood culture is of interest. The patient undoubtedly got his initial sinus infection November 5th, but delay in making the diagnosis postponed interference five days.

Case 5.—Patient was a young white man, age twenty-one. Admitted to the hospital September 2, 1918, with a diagnosis of acute pansinusitis. Had been having headache and profuse purulent discharge from both sides of the nose for three weeks previous to admission. X-ray examination showed slight cloudiness of all sinuses. Patient was put upon treatments of hot irrigations.

September 8th. Six days after entering hospital patient complained of pain in the left ear; membrana tympani was found to be red and bulging. Incised under local anesthesia, resulting in a serosanguinous discharge. There was slight tenderness over the tip. Culture from the ear showed bacillus diphtheriæ. Nasal condition had subsided.

September 8th. X-ray examination showed distinct cloudiness of the left mastoid.

September 11th. Rather profuse discharge; superior canal wall slightly flattened; some tenderness over the mastoid. Operation. Left simple mastoid. Nitrous oxid and oxygen anesthesia. Notes of this operation could not be obtained, so conditions found at operation were unknown to us. Uneventful course until November 22d, during which time cultures became negative for diphtheria.

November 22d. Developed a temperature of 103° rectal. Middle ear and mastoid wound were discharging profusely. There was some tenderness over the zygoma. Temperature normal the next day. Tenderness over zygoma persisted, and on November 20th superior canal wall appeared flattened and the wound was discharging profusely.

November 22d. Temperature again rose to 105° rectal. General examination was negative. There were no chills and no tenderness in the neck. Reflexes all negative. There was a slight spontaneous rotatory first degree nystagmus to the right. White blood count, 6,650; fundi negative.

November 23d. Condition shows no change; white blood count, 7,000.

November 25th. Temperature, 105.2; some nausea and vomiting; no chills; reflexes negative. Lumbar puncture performed; fluid clear; no increase of pressure; cell count normal; globulin negative. Nystagmus had disappeared.

November 26th. Report on blood culture positive for streptococci. Operation. Nitrous oxid and oxygen anesthesia; mastoid wound reopened and granulations removed from cavity. Good sized area of dura found exposed. Considerable number of zygomatic cells containing pus were found and cleaned out; some remaining tip cells cleaned out; plate over sinus necrotic and was removed; sinus wall appeared thickl ened and rather gray. In the angle between the middle fossa and the sinus the curette opened up a large pus pocket. Wound was packed with iodoform gauze and partially closed with silkworm gut. The next day the patient seemed better and the temperature was down.

November 29th. Temperature rose again to 104°. There were no chills. White blood count, 7,000. Reflexes negative. Middle ear was dry and the wound clean. There was considerable tenderness in the neck along the jugular vein. Operation, nitrous oxid and oxygen anesthesia. The internal jugular vein was ligated in the manner before mentioned and the wound closed with silkworm gut. Mastoid wound reopened and sinus incised and good sized thrombus removed. A portion of anterior wall was excised and the sinus packed with iodoform gauze; wound partially closed. Patient ran a septic course for the next twenty days.

December 3d. He has his first chill.

December 4th. Packing was removed from the sinus and pus was seen coming from the lower portion. Iodoform strip inserted toward the bulb. This was changed daily and, after two days, no pus was noted.

December 12th. Second chill, following which temperature went to 104.6°. Some nausea and vomiting. Wound clean. No nystagmus. Cochlear and labyrinth apparently not involved. Reflexes negative.

December 18th. Temperature normal and convalescence was uneventful from this time on. Restored to duty January 26, 1919.

The main factors of this case seem to be incomplete mastoid operation in the first place, plus a lack of resistance on the part of the patient as shown by the absence of any leucocytosis. Operation on the sinus was undoubtedly delayed. It should have been performed at the time of the secondary mastoid operation. It is to be feared that lack of confidence in the laboratory finding of a streptococcic blood culture had a great deal to do with this delay. It is easy to see now that interference on the sinus would have been the proper course to have pursued, but at that time we hesitated to convict the vessels on a septic temperature and positive blood culture, without first cleaning out the infected mastoid area. This is another case where more confidence and cooperation among the different branches of the profession would have reacted to the patient's good.

Libman says: "If the middle ear has been properly drained and the mastoid operated upon, and there is no meningitis or other cause found to account for the bacteremia and persistent symptoms, by exclusion, we must assume a lesion present in the veins."

The mastoid area was undoubtedly incompletely cleaned out at the first operation, and it was proper for us to rule this out first. However, the appearance of the sinus at the second operation was very suggestive of a thrombosis. Looking backward on the case now, there seems to be no doubt that the sinus should have been opened at this time and the jugular ligated, another error on the part of conservatism. The diphtheritic otitis, at the onset, apparently had little significance as regards the subsequent sinus involvement.

Case 6. Patient was a well developed man of thirty-eight years. Admitted to the hospital January 24, 1919, with a diagnosis of right acute suppurative otitis media. Family history negative. Past history negative. On admission, membrana tympani was incised, resulting in a slight thin discharge. The ear improved until January 30th, when because of increased and pulsating discharge it was necessary to incise the membrana tympani again.

February 1st. There was a slight flattening of the superior canal wall, but no mastoid tenderness or edema.

February 2d. Temperature, 101.4° p. m.

February 3d. Operation. Right simple mastoid. Nitrous oxid and oxygen anesthesia. Usual incision; cortex extremely thick and mastoid found broken down and cavity filled with free pus. There was a perisinus abscess, sinus far forward and covered with granulations. The mastoid was exenterated and the cavity filled with iodoform gauze and wound partially closed with silkworm gut.

February 4th. Temperature, 101.6° a. m., 103.8° p. m. This gradually came down until February 8th, when it was 98° a. m., 100.4° p. m. The next day temperature rose to 105° in the evening. Evening temperature continued between 104° and 105° for the next two days, with a slight discharge from the middle ear. Wound was clean. There were no chills. Examination of the lungs showed transient râles at both bases.

February 9th. Examination of the fundi showed slight blurring on the nasal side. Reflexes were negative.

February 10th. Middle ear was dry. Temperature gradually came down again until February 15th, when he had a chill, following which temperature rose to 105°. Examination of the urine showed some pus present.

February 15th. He had another chill in the evening. White blood count, 13,400; polymorphonuclear leucocytes, 77. Blood culture negative. Diagnosis of sinus thrombosis made.

February 16th. Patient had another chill before operation could be performed. Operation. Nitrous oxid and oxygen anesthesia. Usual ligation of internal jugular vein and an exploration of sinus revealing a parietal thrombus; anterior wall excised and sinus packed with iodoform gauze. Ran a septic course until February 25th, when temperature was 99° a. m., 100° p. m.

February 19th. After being typed, patient was given a blood transfusion. Neck wound was healed, middle ear dry and mastoid clean. Blood cultures persistently negative.

February 26th. Complained of pain in right elbow.

February 27th. Temperature rose to 105 coming down to normal the next day. There was another rise of temperature March 3d following a chill. Septic course for the next five days. Swelling noted in neck under old healed incision. This was reopened and considerable pus evacuated. Examination of fundi normal. Uneventful course from now on. Elbow responded to simple treatment.

The essential factors in this case were the virulence of the infection and the delay in operation because of the thick cortex masking the signs. The pus in the urine distracted our attention from the sinus for a time, and the absence of chills, positive blood culture and the slight leucocytosis delayed operative interference upon the sinus too long for the patient's good.

Case 7.—The patient was a young white man, age twenty-two. Admitted to the hospital December 29, 1918. Diagnosis, measles. Family history negative. Past history, mumps and whooping cough in childhood, typhoid fever nine years ago, appendectomy two years ago.

January 5th. Complained of pain in the right ear. Examination showed a right acute suppuraive otitis media. Membrana tympani incised, resulting in serous discharge. Next day there was slight mastoid tenderness.

January 7th. The tenderness was increased, and there was a profuse discharge from the middle ear, with complete loss of landmarks. Temperature was 103°.

January 8th. Condition the same. Temperature, 102°.

January 9th. Profuse discharge from the middle ear. Increased mastoid tenderness. Temperature, 103°. Operation. Right simple mastoid. Nitrous oxid and oxygen anesthesia. Usual incision showed large pneumatic mastoid, and cell walls not broken down, but containing free pus. Antrum opened and mastoid exenterated. Iodoform gauze to cavity. Wound partially closed with silkworm gut.

January 10th. Temperature, 101° a. m., 102.2° p. m. This gradually came down to normal on January 14th. The mastoid wound was clean but the ear was discharging. This condition persisted until February 5th, when he complained of headache and stiff neck. Temperature was normal, pulse 72. There was a question of rigidity of the neck and a suspicion of a positive Kernig. White blood count, 19,300. Considered to be meningeal irritation but neurologic examination resulted in a diagnosis of psychoneurosis. Lumbar puncture was performed. The fluid was clear and under no increased pressure, cell count, etc., were normal. Fundi negative. Heart and lungs negative. Urine negative.

February 6th. It was noted that there was a paralysis of the right external rectus muscle. Temperature, 100.4° p. m. Cochlea and labyrinth responded normally to tests. No involvement of fifth nerve. Middle ear still discharging, and there were unhealthy appearing granulations in the wound. No change for the next four days. Secondary operation advised.

February 10th. Operation. Secondary mastoid. Nitrous oxid and oxygen anesthesia. Wound reopened and granulations cleaned out. Epidural and perisinus abscess found. Sinus apparently patent, although gray in color. Iodoform to cavity. Wound partially closed.

February 11th. The canal appeared swollen and tender and there was considerable discharge.

February 14. The right shoulder joint sore. Nothing found on examination. At this time patient was running an afternoon temperature each day of about 101°. Blood cultures persistently negative.

February 19th. White blood count, 10,000. Wassermann test negative.

No change until February 27th, when a granulating fistula was noted in the floor of the canal which had been swollen for some time. A probe was passed for a considerable distance downward toward the floor of the middle ear. Apparently the middle ear was dry and the discharge coming from this tract. There was slight swelling noted in the neck just below the tip of the mastoid.

February 28th. Swelling in the neck had increased. This was tender but not fluctuant. It seemed to be rather a brawny induration. This gradually increased downwards until it reached the level of the thyroid. Patient was running a temperature of about 101° every afternoon and was the picture of a low grade sepsis. Heart, lungs and urien negative.

This was considered probably a case of atypical sinus involvement. The continued, if low grade, sepsis following one rise of temperature to 103°, and the presence of localizing signs in the right side of the neck made exploration at least advisable.

March 6th. Operation. Nitrous oxid and oxygen anesthesia. Incision of neck parallel to the anterior border of the sternomastoid. Deep dissection revealed a large inflammatory mass, including large lymphatic glands, the whole being adherent to the carotid sheath. This mass was dissected out, the sheath opened and the internal jugular vein found to be collapsed. This was ligated and resected for a considerable distance. The mastoid was reopened and granulations removed from the cavity. The plate covering the sinus was very soft and necrotic in the lower portion, where it remained from previous operation. Sinus exposed downward almost to bulb and wall found covered with granulations. Sinus opened and found thrombosed. A portion of the anterior wall was removed and after being curetted to the bulb the sinus was packed with iodoform gauze and the wound partially closed with silkworm gut. The neck wound was drained for three days and then allowed to heal.

Following the operation the middle ear was dry, and there was no more discharge from the canal. The swelling gradually subsided in the neck and the canal opened up. The temperature continued as before for a few days, but after March 15 it remained normal. The mastoid wound was healed by March 24. The paralysis of the sixth nerve subsided in about two weeks. Restored to duty April 1.

Here we had almost a fulminating mastoiditis following measles, complicated by rather an atypical sinus infection. So rarely does a case follow the classical textbook picture that it is almost to be doubted whether there is any such thing as a typical or atypical form. This might follow the type Tobey[14] speaks of as typhoidal. The initial invasion of the sinus probably took place January 10, with the rise of temperature to 102.2°. Following this we had a long continued low grade sepsis. There were no chills. Blood cultures were persistently negative. After February 5 there was no marked leucocytosis. Whether the sixth nerve paralysis was due to infection of the inferior petrosal sinus from the bulb, as in the cases reported by Pierce,[18] or was purely toxic, it is difficult to say. This is not infrequently seen in acute suppurative otitis media. The meningeal irritation was not something absolutely uncommon. Serous meningitis has been seen in sinus thrombosis. He was watched for the possibility of Gradenigo's syndrome, but no involvement of the fifth nerve was ever noted. Apparently the bulb was involved. In the case reported by McCoy,[19] the suppuration in the bulb persisted, requiring the performance of the Tandler operation. This case responded rather promptly to simpler measures, curettage and drainage of the bulb with removal of infected material from the neck.

ETIOLOGIC FACTORS.

Virulence.—The virulence of the infection seemed to play an important rôle in all the cases of this series except possibly cases 3, 5 and 7. In Case 7 it manifested itself by the acute fulminating type of mastoiditis, after which this factor seemed to lose its prominence and the case ran quite an atypical course.

Low Resistance.—This factor was quite evident in Case 1, where the patient was anything but rugged to start with, and in addition was considerably worn down by measles and bronchitis. On the contrary, Case 2 showed remarkable resisting powers, which enabled him to overcome his infection. Case 3 was tubercular and showed low resistance both in a general way, and in the low white count seen shortly after the onset of his sinus infection. Case 5 likewise exhibited poor resistance and never showed any increase in leucocytes during any stage of the disease. Cases 4, 6 and 7 showed good resisting power.

Delayed Operation.—Delay in performing the mastoid operation was an essential factor in Cases 1, 2 and 6. In the first, however, operation was performed on the side which was later thrombosed, about as soon as the picture warranted. Operation on the right side, a day or two earlier, might have helped in conserving his general resistance. Cases 2 and 6 were delayed because of masked signs. It is only fair to say that all the cases show a delay in performing the sinus operation, due to tardiness in making our diagnoses. Frequently we lack the courage of our convictions. This series seems to point out this common error in an unmistakable way.

Incomplete Operation.—Two cases, Nos. 5 and 7, are examples of this. The mastoid was not thoroughly cleaned out at first operation in either case, and the pathologic process went on until there was an invasion of the sinus.

PATHOLOGIC FACTORS.

All the cases in this series, with the exception of No. 4, showed perisinus abscess, although in Cases 5 and 7 this was not noted at the first mastoid operation. However, these were the cases which later gave evidence of having been incompletely exenterated. At the second operation, a perisinus abscess was found in both cases. The process was the confluent, or cell route, variety. The invasion of the sinus in Case 4 was apparently by necrosis of the inner table and direct extension to the sinus wall.

The bacteria, as demonstrated by blood culture, was streptococcus in Cases 1, 2, 3 and 5. No organism was isolated in Cases 4, 6 and 7.

SIGNS AND SYMPTOMS—CLINICAL FACTORS.

Temperature.—As has been pointed out by McKernon, Dench and others, this is by far the most important symptom. Each case ran a typically septic temperature, except No. 7, in which there was one rise to 102.2°, followed by a slight rise of one or two degrees every afternoon. If it had been possible to rule out other febrile conditions, this alone should have enabled us to have made our diagnosis earlier.

Pulse and Respiration.—In all the cases pulse and respiration were proportionate with temperature in their deviation.

General Appearance.—Sooner or later all the cases showed the picture of general sepsis. However, it would have been decidedly advantageous to have made the diagnosis and instithe proper surgical course before the appearance of this sign. To interfere in time to minimize general sepsis should be our endeavor.

Chills.—All but Case 7 exhibited chills, although these were not seen in Case 5 until after ligation. Here again we have a symptom often appearing rather late in a disease, and it would seem a mistake to wait for its appearance, if possible to make a diagnosis without it. Malaria must be ruled out before accounting for the chills by sepsis.

LOCALIZING SIGNS.

Tenderness in the Neck.—This was noted in Cases 4, 5 and 7. In the last it, indeed, served as our guiding star, pointing out to us the proper course when other signs failed. When present it is decidedly helpful, but absent, it means nothing.

Edema Over the Emissary Vein.—This was noted only in Case 1. Like the preceding, it is useful only when present; indeed many consider this due to pus under the periosteum and not a sign of venous obstruction. The zygomatic edema and swelling seen in Case 2 was undoubtedly due to the involvement of the zygomatic cells and had no significance as regards the sinus.

Fundi.—Blurring of the disc margins with varying degrees of venous engorgement was noted in Cases 2, 5 and 6, but it was too late a factor to be of much diagnostic aid. Of these three, Case 6 showed only slight changes. Subsequent examinations, during convalescence, showed the discs returning to normal.

Case 7 showed a paralysis of the right sixth nerve, probably either toxic or caused by extension of the process via the inferior petrosal sinus to the apex of the petrous.

Nausea and Vomiting.—This was noted in Cases 2 and 5, and then only in the later course of the disease, as an element of the general sepsis.

Leucocytosis.—Cases 1, 2, 4 and 6 showed a characteristic leucocytosis, with an increase of polymorphonuclear leucocytes of over 80. Ac McKernon has pointed out, this last is indicative of an infective condition demanding interference. Case 3 showed a typical leucocytosis and then a sudden drop to 10,000 just before operation was performed, probably due to a lowering of his resistance. Case 5 showed almost a leucopenia throughout, obviously a case of low resistance. Case 7 showed a slight increase in white cells. While the presence of a leucocytosis is of aid in making the diagnosis, it is mainly indicative of the patent's condition. The increase of polymorphonuclear leucocytes in the differential count is of more value.

Blood Culture.—Four of the cases, 1, 2, 3 and 5, gave a positive blood culture, although not always early enough to be of greatest diagnostic value. Three were persistently negative, although without doubt a bacteremia existed. According to Braun, coincident diseases in which it is possible to have a bacteremia are acute tonsillar infections, acute bacterial endocarditis, meningitis, scarlet fever, typhoid fever, pneumoina and possibly erysipelas. Ruling out these other conditions, a positive blood culture in a case of mastoiditis running a septic temperature, otherwise unaccounted for, should make the diagnosis of sinus thrombosis certain.

Metastasis.—Four of these, 1, 2, 6 and 7, showed metastatic involvements, but only in the last was this of diagnostic aid. This is really one of the end results of the disease and rarely occurs early enough to serve as a basis for diagnosis. Often it is confirmatory evidence.

SUMMARY.

Of the seven cases in this series, six showed a typically septic temperature, general septic appearance and chills, although occurring late in two of them. Two of these six cases showed localizing signs in the neck, and one other, edema over the emissary vein. Five showed a leucocytosis with increase of polymorphonuclear leucocytes, while one showed a leucopenia. Four showed positive blood cultures, all of them streptococcic. Three cases showed fundus changes. Metastases developed later in three of the six. One case showed one moderately high rise of temperature, followed by a daily elevation each afternoon of one or two degrees. This case also showed a slight leucocytosis, paralysis of the sixth nerve, and later inflammatory signs in the neck and metastatic involvement of the shoulder joint.

CONCLUSIONS.

1. The best prophylaxis for sinus thrombosis is thorough exenteration of the mastoid as soon as a diagnosis of suppurative (operative) mastoiditis is made.

2. Despite early and thorough surgery, sinus infection will occur in certain cases because of the virulence of the infection or the low resistance of the patient.

3. Operative interference should be instituted as soon after sinus infection has taken place as possible. Early operation will avoid much long drawn out and stormy postoperative period.

4. If performed early the ligation of the internal jugular vein, followed by exploration of the sinus and removal of its external wall, would seem sufficient. The horizontal crease incision leaves the best cosmetic result.

5. Temperature is the most important symptom. If otherwise unaccounted for, a septic temperature in a mastoid which has been thoroughly operated should be considered as indicative of sinus infection. Other conditions which might possibly cause a bacteremia being ruled out, a positive blood culture makes this diagnosis certain. Chills, the blood picture, localizing signs, etc., are important if present.

6. Operation should be performed as soon after the onset of the infection, as shown by the temperature, as it is possible to make a diagnosis.

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LXXVIII.

THE EDUCATION OF THE VESTIBULAR SENSE.*

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This study is restricted entirely to physiology. For the sake of clearness, certain definitions should first be made. The vestibular apparatus is defined as including the vestibular portion of the internal ears, the intracranial pathways from this portion of the internal ears, and the brain centers. The term, vestibular sense, is restricted to the function of this apparatus. The vestibular sense is one thing, "deep sense" another thing, eye sense another, and touch another.

Each organism has developed its own special sensory equipment to meet the particular needs of its life and environment. In order to avoid catastrophe and hazard in coming in contact with the external world, one of the first requisites of animal life is the sensing of motion. The lowest forms of animal life, like the coral, come into existence, live and die without changing position. As motion is no part of its life, the coral has no need for motion sensing. Higher in the developmental scale, animal life is freed from an anchored existence and is tossed about upon the ocean bed by the waves; motion becomes a natural part of its life destiny and motion sensing becomes a requisite. The primitive otic cup develops to fill this need; and sensory hairs are acted upon by water and sand particles. The amphibious animal, during its land excursions, becomes exposed to air borne wave shocks of greater delicacy and of more or less regular wave length. These cannot be sensed by the already developed motion sensing apparatus, and in response to this new need it develops a primitive cochlea. In animals living in fluid media the need of motion sensing is naturally greater; some fishes develop upon their surfaces additional sense organs, enabling them to sense all motion accurately and instinctively—

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the socalled linear endorgans. Thus their equipment includes visual sense, vestibular sense, deep sense and "visual line" sense. Similarly, in birds the semicircular canals are developed to a relatively enormous extent, in response to their particular necessity for full and instinctive possession of adequate knowledge concerning motion.

The blank cerebral cortex of the baby begins to receive messages from his special senses. That is the beginning—the end result is the fully developed child with normal equilibration. What are the steps of this development?

The human infant is endowed at birth with only four known sensory gifts which he may utilize for motion perception: vision, "deep sense," touch, and vestibular sense. These constitute the means of his acquiring information and experience with respect to motion; upon the proper use of such sensory information depends his further development of certain motor abilities. When he first attempts to sit up, the force of gravity pulls him over and he bumps his head—thereby encountering pain, perhaps for the first time. As he is being pulled over by gravity he sees he is falling, he experiences a sensation of falling coming from his deep sense and that coming from his ears. With repeated experiences of this sort, his memory gradually stores up the knowledge that, given this deep sense, visual and vestibular testimony, pain (the bump) is inevitable. His developing mentality commences to interpert these sensory impulses which tell him he is beginning to fall; appropriate motor coordination begins to develop and then become evident attempts to check the fall. Eventually he becomes able to sit up without falling. Still later, in the same way, he becomes able to stand, then to walk, then to run.

Whereas sight, deep sense and touch contribute to the general detection of motion, yet, for critical requirement, it was apparently necessary for all animals that move about to possess, in addition, an organ whose sole function is the sensing of motion. To fill this need, nature developed within the human bony cranium a single physical apparatus—the vestibular portion of the internal ear. Just as the eyeball is the prototype of the camera, and the tympanum the prototype of the telephone, so this apparatus is the prototype of the seismoscope. The eyeball is devised for only one physical operation—the focusing of light waves; the tympanum, with its vibrating drumheads and ossicular chain, is devised for only one physical operation—the transmission of sound waves; just so the semicircular canals and the saccule and utricle with their fluid content bathing erect hairs, make up an instrument devised for only one physical operation—the detection of motion in every direction. The impulses from this motion sensing organ, integrated in the sensorium with those from all other sensory sources, go to make up the individual's composite motion perception. To what degree each one of the special senses contributes to perfect motion sensing is not known; we do know, however, that the absence of any one of these elements impairs full motion perception. Observation shows that the equilibration of any individual who lacks one of the three main fundamentals to motion sensing is below that of the normal. For example, the individual lacking vestibular sense, or the tabetic lacking deep sense, cannot stand on one foot with closed eyes. The reason for this inability is that his motion sensing composite is inadequate for necessary motor coordination; beginning motion of the fall is not sensed with sufficient speed and delicacy to permit him to make necessary motor adjustment in time to prevent the continuation of the fall. The normal "catches himself" before the falling becomes evident.

Studies of the vestibular sense are comparatively so new that it might be well to attempt to state what we do and do not know at the present time concerning the semicircular canals and their intracranial connections. When we all went to medical school the course in physiology included several weeks on the eye, several weeks on the organ of hearing, and considerable time on the study of the other special senses. Is it not rather striking to remember that all we heard in our physiology course was a casual mention, somewhat as follows: "The semicircular canals are situated posterior to the cochlea, and are 'concerned with equilibrium.' We will now take up the study of the heart."

Why was the vestibular sense overlooked through so many years? Perhaps because motion sensing is not so obtrusive in our everyday life as are sight, hearing, smell or taste—

those senses which minister to our pleasure or displeasure. Pleasant and unpleasant sights, beautiful music and harsh noises, agreeable and disagreeable odors, and the taste of good food or bad—these things obtrude themselves upon our notice; the perfect sensing of motion does not attract our attention. Here all the time was a good servitor who did not make his presence felt.

Another very practical reason for our comparative ignorance of the vestibular apparatus is that there were no technical methods devised for testing or studying this mechanism until the comparatively recent introduction of the turning, caloric and galvanic tests, whereas for a long time we have had the means at hand to test and examine the other sense organs.

In spite of the present limitations of our knowledge, is it not, however, a fact that there are certain things which, even now, we know to be true and accurate about this apparatus? We have a clear knowledge of the microscopic anatomy of the internal ear, due particularly to the work of the Vienna school and G. E. Shambaugh, and the physics (or mechanics) of the semicircular canals has been made clear. Further, it would seem that the following fourteen points are fairly established:

1. This end organ is developed phylogenetically and embryologically second of all—preceded only by touch.

2. The horizontal canals may functionate independently, whereas the vertical canals—the superior and the posterior—always act together for a mechanical reason—because of the existence of a common crus.

3. The horizontal canal is connected with the third and sixth pontile nuclei. The obvious proof is that stimulation of the normal horizontal canal always produces a horizontal pull of the eyes.

4. The vertical canals are connected with the third and fourth nuclei. Proof: Turning or caloric stimulation of the vertical canals produces vertical or rotary—but never a lateral—movement of the eyes.

5. The horizontal canal fibers and the vertical canals fibers have separate and distinct intracranial pathways after the eighth nerve enters the brain stem. (Pages 122 to 128, book "Equilibrium and Vertigo.")

6. Impulses producing nystagmus follow different nerve paths from those producing vertigo.

7. Stimulation of the ears produces only the slow pull of nystagmus, not the quick jerk.

8. The eyes are always pulled in the direction and plane of the endolymph movement.

9. In the normal, stimulation of any canal causes a sensation of motion.

10. This sensation of motion, vertigo, is always in the exact plane of the endolymph movement and in a direction opposite to the endolymph movement.

11. Past-pointing is not a "Reaktion" (Barany); it is a voluntary attempt to locate the external object at a point where it is not. Both past-pointing and falling are expressions of a sensation of motion.

12. The normal duration of after-turning nystagmus is 24 seconds.

13. Normal responses to ear stimulation determine definitely that the vestibular apparatus is intact.

14. Failure of normal responses to ear stimulation is definite evidence of some abnormality of the vestibular apparatus.

Having up to this point discussed the physiology of motion sensing, and having emphasized that the vestibular sense is only one of the four senses concerned, we might now take up examples of education in motion sensing. In this connection we might well ask ourselves, What is known about aviation, otologically, that we did not know three years ago? We know:

1. An individual can become an excellent flier without being perfectly normal physically. As Glen Curtis puts it, "Anybody who can ride a bicycle can fly an airplane." The "mystery" that surrounded aviation in the early days is now cleared up. Flying is a much simpler matter than we had thought.

2. While everyone can fly, safety demands that not everyone should fly. War experience has taught the other countries the necessity of raising their original standards of physical requirements. The man with good heart, lungs and kidneys, normal sight, normal vestibular sense and stable nervous sys-

tem is a far safer pilot than the man laboring under the handicap of any physical deficiency.

3. We now know that no set of tests or special examinations yet devised in any country can predict whether any given individual will become a good flier or not. This demonstrates the wisdom of the United States Air Service in never attempting any such prophecy. So many have considered that tests were useful only as they "correlated with flying ability." It cannot be done. The requirements of our service were the securing of a normal individual; this increased the factor of safety and made more sure that the flier's future usefulness would not be impaired by discoverable physical defect.

4. We now know that the ear plays a far greater rôle in flying than we originally suspected at this meeting three years ago. It is well enough to have a normal ear, but we have found that the brain must be trained to interpret the unusual impulses coming from the internal ear in aerial acrobatics.

Many crashes and deaths are directly traceable to this lack of education in interpreting the ear stimuli. We have learned that it is possible to educate the vestibular sense and also the visual and deep sense through actual aerial acrobatics; or more safely, by a course of training in an orientator. It must be further noted that an acquired education of the vestibular sense may be lost or partly impaired through disease. Hence a perfectly normal and trained flier may, through fatigue, toxemia or what not, become unfit for flying. Dangers from this source can be prevented by frequent reexaminations.

Taking up each of these points in further detail:

1. We now know that one eyed men, men with noticeably impaired semicircular canal function, one legged men—all may make good fliers; the immortal Guynemer accomplished his best work while dying from consumption—he had hemorrhages from the lungs from time to time and then would return to active flying duty.

2. Medical men of different specialties in all countries were asked to study the physiology of flying and to attempt to devise a series of tests which would eliminate the possibly unfit from their respective air services. Vestibular tests

were made an important feature of the examination in every country. The Germans and Austrians required the caloric as well as the turning tests of the ear mechanism; these tests were conducted by their most skilled labyrinthologists. The Italian Air Service work was under the direction of Gradenigo; special turning chairs were devised and a new method of making the pointing tests was used. The French used both the turning and caloric tests and employed specially constructed turning chairs. Belgian labyrinthology is best represented by the electric turning chair and nystagmograph of Buys of Brussels. The Canadians also routinely used the turning chair and in doubtful cases used the caloric test, as we did.

The English, like all the others, felt it important to determine that the vestibular mechanism was normal; their present point of view is perhaps best expressed by quoting "Reports of the Air Medical Investigation Committee on the Sense of Stability and Balance in the Air." Dr. Henry Head, chairman of the Investigation Committee, gives the following conclusions (page 43):

GENERAL SUMMARY.

"1. Conscious stability and comfort in the air depend primarily on the normal response of three groups of sense organs. These are the vestibular apparatus, the eyes, including the eye muscles, and the proprioceptive system with its endings in muscles, tendons and joints . . . We are interested in those impressions which lead to recognition of the position of the body in space.

"2. Defective responses from any one of these afferent end organs will disturb the sense of equilibrium in the air and may lead to actions that affect the stability of the machine.

"3. No candidate for service in the Royal Air Force is accepted who shows gross abnormality of any one of these primary organs of sensation."

This expresses in a very clear way the exact viewpoint of the United States Air Service also. During the war, however, the English method of determining "vestibular stability" did not include the turning or caloric tests; on reviewing the otologic work of the English, Dr. Head states: "'Vestibular stability' is estimated by the power to walk along a line, to turn on one foot and to stand on one leg with the eyes closed. But there is no evidence to show that any of these acts bears a direct relation to the activity of the semicircular canals. Moreover, I have examined four pilots who were intensely giddy and vomited in the air, none of whom had the least difficulty in carrying out these tests perfectly. . . . There is nothing to show that inability to walk a line and to turn on one foot is evidence of anything more than clumsiness. . . . One cadet found difficulty in walking heel to toe and turning on one foot. He ultimately became an excellent scout pilot, but confessed that he disliked dancing. In fact, it seems to us that this test is more likely to show ability to dance than any capacity to fly. But whatever relation it may bear to flying, it is certainly not evidence of 'vestibular stability.' . . . Of the ten who had been 'giddy' and vomited, nine reacted excessively to rotation in the chair. . . . We can bear with impunity certain violent disturbances of equilibrium if the stimulus is expended on certain parts of the vestibular apparatus, but not if it falls on other combinations of the semicircular canals. . . . The majority of normal men do not suffer from these symptoms in the air. There are, however, some in whom the physiologic response is so violent that it can never be overcome, and they are always giddy and nauseated whenever there is any sudden or considerable change in equilibrium. . . . The majority of these patients could not swing with comfort in childhood and habitually suffered from train sickness. When rotated on a chair the larger number were uncomfortable and suffed from nausea and sweating."

The American viewpoint is in entire accord with the findings and conclusions of Dr. Head, in that the English tests, just quoted by him, are not adequate; our Air Service has used in addition—from 1917—the turning and caloric tests to determine the function of the vestibular apparatus.

3. No one denies the wisdom of making every effort to choose normal men for flying; but what does constitute the normal? Visual, auditory and general physical standards were commonly recognized and established, but vestibular standards were not. The vestibular requirements set by our Air Service were that the average normal should show between 16 and 36 seconds of after-turning nystagmus.

At the time of the adoption of these standards it was recognized as a very difficult matter to state dogmatically what is the average length of nystagmus and past-pointing. All that could be relied upon were deductions from clinical experiments with a series of healthy individuals examined by various observers over a period covering ten years, as contrasted with the impaired responses observed in merely a few hundred pathologic cases. It was realized that it was a great responsibility to establish what should be regarded as normal responses. We therefore publish at this point the composite results of the turning chair test performed by skilled standardized otologists in the examining units on many tens of thousands of applicants for the aviation service. A compilation of statistics has been made, the digest of which, with respect to responses in nystagmus, past-pointing and falling, confirms the standards originally set.

For detailed statistics the reader is referred to the book, "Air Service Medical," published by the Division of Military Aeronautics, pages 83 to 94, inclusive. The average duration of nystgamus of the entire number examined and tabulated was, after turning to the right, 23.5 seconds; after turning to the left, 23.2 seconds. The average number of past-pointings was between three and four past-pointings of each arm in each direction.

It is interesting to note that these figures are quite at variance with the findings of Barany, who stated that the average duration of nystagmus after turning to the right is 39 seconds and after turning to the left, 41 seconds. The first one to call attention to the inaccuracy of these findings was George McKenzie, of Philadelphia, who in 1917 (Observations on After Turning Nystagmus, by George W. Mackenzie, Philadelphia. ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY, June, 1917) corrected Barany's work and stated that 24 seconds is the normal response.

Of those rejected, 50 per cent failed in the eye requirements, as compared with only 6 per cent in the vestibular tests; and yet Dr. Henry Head states, "American workers have laid great stress on this response to rotation . . . in fact, this method of examination formed, at one time, the determining test for admission to their Flying Service." This statement, of course, is simply due to unfamiliarity with the official examination blank (A. G. O., 609). This statement also infers that our point of view has altered; our standards are unchanged.

4. It is an idle task to speculate on the relative importance of each of the special senses to the aviator. They are all important. The need of a normal vestibular mechanism in motion sensing, however, was illustrated by experiments conducted with deafmutes on the flying field of Mineola, Long Island. These have demonstrated that those deafmutes who lack vestibular function when taken up in a plane blindfolded, could not tell the character and nature of simple evolutions. Furthermore, when taken up repeatedly it was impossible for them to develop any proficiency in motion sensing. These were checked by identical maneuvers with normals. These normals were able to detect the maneuvers much better than the deafmutes on their first trial, and further, with a few repetitions they quickly acquired more and more ability to detect these evolutions.

The one big asset to the flier is confidence. Until he has educated his vestibular sense he cannot have this confidence. Edward Rickenbacker states:

"I remember when I thought it was time to try a vrille or tail spin. I knew what I was supposed to do. I knew you put the stick over and crossed the controls, but I'd never seen anybody do it. I went up about 12,000 feet, got off some distance from the field, and flew around there for every bit of thirty minutes trying to get up my nerve to try the trick, but too scared to begin. At last I said to myself, 'What's the matter with you? You've got to do this,' and threw the stick. She went into the spin all right but I had her back to neutral after just one whirl, and I tell you I was glad when she righted. Next day I went out, and it took twenty minutes to make up my mind again. It was only on the third day that I went at the job with any confidence and let her do a real spin.

"That is still more or less the way I feel about doing a new stunt, after all the flying I have done at the front since. When you try a new thing, you are never quite certain how the machine will behave, and though you may have confidence in your ability to get out of anything as long as you have the altitude, there is a sort of hesitation, both in the machine and in you. The trouble is, you do not know what the strains will be on either."

Every aviator has gone through exactly the same experience; but little by little he becomes familiar with these queer sensations until, fully trained, right in the midst of a spinning nose dive or tight spiral, instead of wondering "Will I ever come out of this?" he is thinking, "I wonder where I mislaid those keys this morning?"—or some such trivial thought. Acrobatics becomes a matter of pleasure rather than of fear.

The orientator is a new additional safeguard in aviation; it also provides a new method of vestibular studies. The inventor of this apparatus, William Guy Ruggles, has perfected a "turning chair" that will revolve in all conceivable planes about a central point. From a purely theoretic standpoint, he had the vision to conceive of an instrument that would permit an individual to do the "otologic part" of flying before going into the air. Furthermore, this instrument is not merely otologic—it also trains the eye and all sonses concerned in motion sensing. This machine does not teach the pupil to fly, but does duplicate all the stimulations produced in spins, spirals, loops and all turning evolutions possible in the air. A very useful feature is that the orientator produces much more violent and unusual turning sensations than can possibly be encountered in the airplane. In this way the pupil is safeguarded, by becoming familiar with sensations more intense than he can possibly encounter later in the air.

Many deaths and crashes in the future will be avoided by "orientating" the individual on the ground rather than by "throwing him into the air" to learn it.

From the purely otologic standpoint, this instrument is a great step in advance in the study of the physiology of the vestibular apparatus. From the ear standpoint, aviation has taught us what we could never have learned on the ground, by putting the human being in a fluid medium and subjecting him to twistings and turnings otherwise impossible. Medical experience in aviation has taught us that otologically the ideal flier is one whose vestibular mechanism is sufficiently acute to detect motion keenly; even more important, that this mechanism shall not be hypersensitive, rendering it difficult for him to be comfortable and safe after turning evolutions; in other words, one who is within reasonable limits of the normal. Taking such an individual, training him to become familiar with turning sensations by means of the orientator, and then permitting him to undertake aerial acrobatics—this is the safe and sane method to begin "learning to fly."

What is the next step for future research? Fliers should be trained blindfolded, both in the orientator and in the airplane. Sufficient study has already been made to indicate that in this way the flier becomes more and more keen in the sensing of motion as well as comfortable and efficient while flying at night or in a cloud. Robert J. Hunter (Transactions of the Section of Otology of the College of Physicians of Philadelphia, May 21, 1919) conducted such experiments as Flight Surgeon in the Air Service.

Quoting from Hunter, "Blind men were used in London, during the war, to help locate the Gothas. They could hear them quickly and detect the direction better than men with sight. Silk workers in India detect the slightest variation in thickness with great skill, through the development of their tactile sense. Tea and brandy tasters for the trade have the sense of taste trained. Many here tonight recall the blind man who for years delivered provisions in the downtown sections of this city. I remember well his queer call, and especially the wonderful accuracy with which he found his way through the street. His sense of direction was highly trained."

A new pilot will always dodge a cloud. In the days when protection was of such value in war flying, airplanes could easily hide in thick ground mist, clouds or "smoky horizons"; but it was an unpleasant experience for new men to try it. New to the sensation of having their feet taken from the ground and flying in the air, depending on their "motion sensing," which had never been called upon to take up duties of this character, pilots, in self defense, had to learn this "something" which when acquired meant comfortable flying. This "something" seems to the practical flier to be educating his motion sensing. The eye, deep sense and touch had to be educated in this new environment, but it is to be noted that pilots in clouds become accustomed to cloud flying and instead of avoiding clouds actually make for them; this indicates that some sort of adaptation has been made possible which makes the pilot comfortable after all his vision has been taken away. Pilots who have done a lot of cloud flying state that each time they enter a cloud it becomes less difficult to keep in a flying position.

This then is the next step—to train fliers blindfolded. The instructor can watch the progress of the pupil, and it is reasonable to expect that sufficient instruction can be given in this manner so that a pilot may be assured of increasing ability to fly in clouds or in any condition in which his vision is restricted or entirely eliminated. In this way the education of the vestibular sense would not only familiarize the flier with vertigo sensations but will develop an increasing accuracy in sensing motion.

So much for aviation. Is it not remarkable—the extent to which education in motion sensing can be carried? A man sits on a chair, the hind legs of which are placed upon a rope stretched across a space of thirty feet; he can sense each infinitesimally small motion so accurately that he is able to maintain equilibrium for an indefinite period. However, no matter how constantly a man might practice, he would always be laboring under a marked handicap if he does not possess all fundamental requisites for motion sensing. Conversely, with full sensory equipment, it is astonishing how quickly an individual may become adept in the instantanous correct motion sensing so essential to any motor coordination requiring speed, delicacy and accuracy.

The education of the blind is accomplished by hypereducation of his other senses—and he is then able to live comfortably in spite of his blindness. The education of the deafmute consists in hypereducation of the other special senses. These individuals are able to compensate for their misfortune by the hypereducation of the other senses which are normal. On the other hand, an individual possessed of full motion sensing acuity of vestibular sense, touch, deep sense and eye sense, can be hypereducated. The ability to translate motion sensing into motor coordination can be hypereducated to a degree that will distinguish this individual from others who are also normal. This normal is then enabled to become—by intensive

hypereducation—a tight rope walker, a trapeze equilibrist, a hotel waiter balancing a tray, a stunt flier, an expert in the orientator, a whirling dancer, an acrobatic tumbler, an expert swimmer or an old "sea dog."

Perhaps the most common example of the education of the vestibular sense, with which all people are more or less familiar, is seen in overcoming seasickness. Seasickness is now recognized to be a phenomenon resulting from movement of the endolymph within the internal ear. All forms of motion—rotary, linear fore and aft, and linear up and down—are encountered on a ship in a storm at sea. Unfortunately to get used to the sea, we must go to sea. Every effort has been made by innumerable investigators to make life at sea more comfortable for a "land lubber," only to find that, after all, the only cure for seasickness is the education of the vestibular sense.

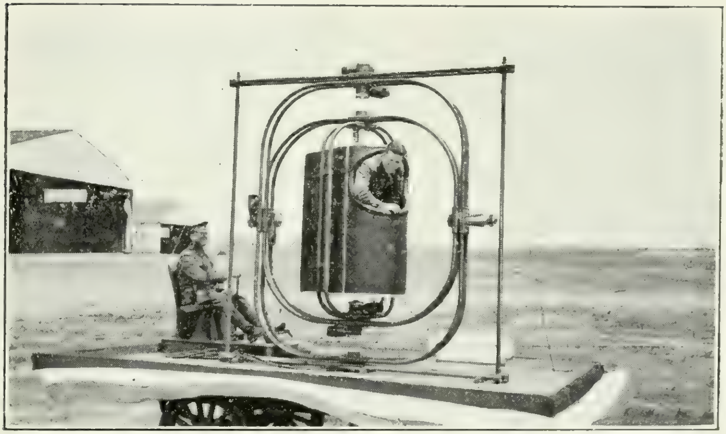

Figure 1.

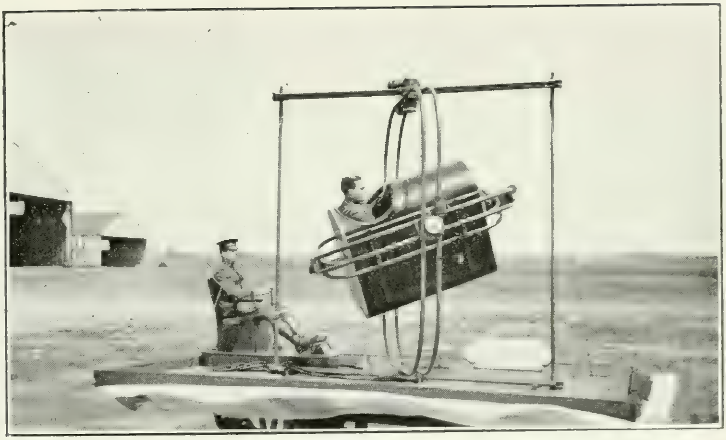

Figure 2.

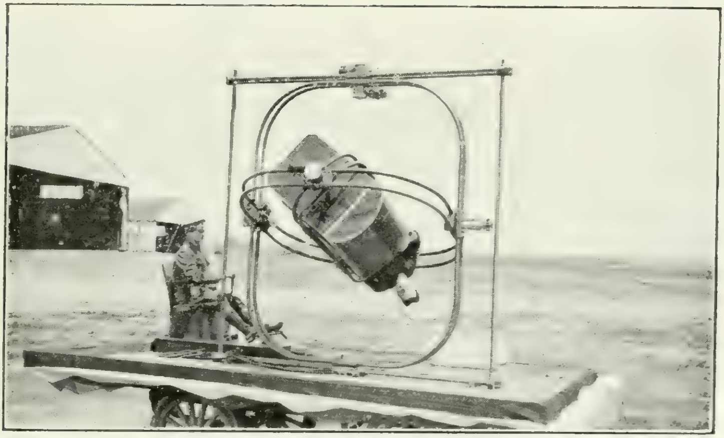

Figure 3.

LXXVIX.

NEUROOTOLOGY.

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Neurootology is a study of the internal ear and its associated intracranial nerve pathways. While it is strictly an ear study and essential to the proper diagnosis of any pathologic ear condition, it is of much broader application as a means of obtaining data for diagnosis and treatment in general medicine and surgery. The internal ear consists of two distinct organs, the cochlea, which is the organ of hearing, and the kinetic static labyrinth, which is the organ of equilibration. The cochlear portion offers a very limited field from a diagnostic standpoint, while the examination and study of the kinetic static labyrinth, consisting of the utricle, saccule and the three semicircular canals, together with their intracranial nerve pathways, affords, on the other hand, a very wide field for diagnosis and treatment.

We are indebted to the Vienna group of otologists for the present methods of examination of the internal ear. Robert Barany was awarded the Nobel prize in 1915 for his original work in this field. His name will be forever associated with the clinical relation of the internal ear and the central nervous system.

For centuries we have recognized only five special senses. Within the last two decades, a sixth sense, the muscle, joint and splanchnic sense, has been recognized. It is unlike the other special senses in that it does not make its impression on our consciousness. By means of this sixth sense the individual performs coordinate acts automatically and unconsciously. The researches which have been made have revealed a seventh special sense, the kinetic static sense, which is a special sense, just as truly as sight and hearing are special senses.

The seventh special sense, in common with the other special senses, is presided over by a special sense organ, which likewise has an end organ, a brain center and nerve pathways connecting them. The end organ is in the labyrinth, and the brain center has been postulated by Mills to be located in the posterior portion of the first and second convolutions of the temporosphenoidal lobe near the cortical center for hearing. It is believed to be more highly developed on the right side.

The nerve pathways or vestibular tracts have not been entirely worked out. From anatomic and physiologic studies and from operative and postmortem findings these tracts may be said to have a definite course from the labyrinth to the cortical center. The fibers from the horizontal canals and those from the vertical canals join the fibers from the cochlea in the vestibule and form Scarpa's ganglion, which gives origin to the eighth nerve. The eighth nerve passes through the internal auditory canal to the brain stem, where it divides into the cochlear portion and the vestibular portion.

The fibers from the horizontal canal and those from the vertical canals have a different course within the brain stem. The horizontal canal fibers go to Deiter's nucleus in the upper part of the medulla and here divide into two separate tracts. The vestibulocerebellocerebral tract ascends by way of the juxta restiform body in the inferior cerebellar peduncle to the dentate nucleus in the cerebellum. The vestibuloocular tract ascends to the posterior longitudinal bundle and goes to the sixth and third eye muscle nuclei in the pons. The fibers from the vertical canals ascend into the pons and divide into two tracts. The vestibulocerebellocerebral tract goes to the dentate nucleus in the cerebellum by way of the middle cerebellar peduncle, and the vestibuloocular tract ascends to the fourth and third eye muscle nuclei in the pons.

The vestibulocerebellocerebral tracts ascend from the dentate nucleus through the superior cerebellar peduncle and the crura cerebri to the pyramidal tract and hence to the cortical center of the opposite side. A few of the fibers go to the cortical center of the same side. The cortical center for the quick component of nystagmus has not been definitely located, but the cerebroocular or supranuclear tracts descend through the internal capsule to the posterior longitudinal bundle and hence to the eye muscle nuclei. The vestibuloocular and the cerebroocular tracts preside over nystagmus, and the vestibulocerebellocerebral tracts preside over vertigo.

When the endolymph in the semicircular canals is stimulated and made to move, two reactions occur in a normal individual, namely, nystagmus and vertigo. Past pointing and falling are the objective evidence of the subjective vertigo. The stimulus is brought about by turning the individual or by douching the ears with cold or hot water for the purpose of changing the temperature of the endolymph. The turning and the temperature changes produce a movement of the endolymph in a given direction. The turning is applied by placing the individual in a specially adapted chair and turning with the head in the proper position, at a certain rate of speed and for a definite number of times. In a normal individual nystagmus and vertigo of a proper type and duration will invariably result. If one or both are absent or changed in character it has pathologic significance. This means that the stimulation did not go through so as to produce a normal reaction.

The other method of applying stimulation to the endolymph is by douching with cold water at 68 degrees or hot water at 112 degrees. This procedure results in the same phenomena that we obtain from turning, namely, nystagmus and vertigo of a given type and duration. Here again if the reaction departs from the normal or is absent it has pathologic significance. Turning stimulates the endolymph in both labyrinths, while douching stimulates only the labyrinth douched. The reaction from the cold douch is the opposite from that obtained from the hot douche.

It is important to remember that a neurootologic examination not only investigates the kinetic static labyrinth, but also its widely distributed nerve pathways. We can from such an examination gain information regarding the pathology of the labyrinth, eighth nerve, medulla, pons, the six peduncles, the cerebellum, the crura cerebri, the pyramidal tracts, the internal capsule and some parts of the cerebrum. It is this wide distribution, all so wonderfully coordinated in health, that has opened up new possibilities to the clinician. There is, in fact, no part of the body musculature unaffected by the ear stimulation. When the reaction is normal it means that the nerve pathways are intact, but when there is a changed reaction or an absence of reaction it means an impairment of either the terminals or the lines of communication.

To the clinician the study of vertigo is an ever present problem. We are dependent for a perfect balance mechanism on the sight sense, the muscle sense and the kinetic static sense. This sense triology makes possible estimations of all sorts, orientation, locomotion, the rate of motion, estimation of weight and the realization of posture and position. The kinetic static sense is most important and it has as its sole function the maintenance of balance. After impairment or loss of one of the three, compensation may occur to a certain degree. The tabetic may learn to avail himself of his sense of sight and his kinetic static sense. The blind man is able to walk until deprived of his muscle sense or his kinetic static sense. Deafmutes in whom the kinetic static sense is destroyed maintain their balance by sight and muscle sense, and develop incoordination only in the dark or in the water. Full compensation, however, cannot develop unless two of the triology remain normal, and perversion of any one of them may be more provocative of trouble than its loss.

Previous to the realization of this important new function of the ear we regarded the ear as purely an organ of hearing. The physician was concerned with the disturbance or loss of the hearing function or with the effects of the extension of infection from the ear to adjacent structures. The general practitioner is concerned with the new development in diagnosis because of the value of the ear tests in determining the cause of vertigo, no matter what its origin or type, and in recognizing pathologic conditions of the internal ear itself. Vertigo is a subjective sensation of disturbed relationship of one's own body to the surrounding objects in space. Although it has been recognized for many years that vertigo may result from ear disturbances, the conception that all vertigo, from whatever cause, is peculiarly an ear study, is the result of the study of the new otology. These dizzy cases suffer acutely with apprehension and, with no explanation at hand, their apprehension increases. The vague terms in which vertigo is often spoken of is an index of the uncertainty in our minds regarding this distressing condition. Often we speak of intestinal or stomach vertigo or dizziness from refractive errors or from Bright's disease or neurasthenia without thinking of the real mechanism of its production.

It has been impossible to tell, in any given case, whether the vertigo was due to a functional or organic disease and still less to recognize whether it was of trivial significance or the forerunner of some serious disease. Vertigo should be considered as a distinct clinical entity, deserving as careful investigation and analysis as any other distressing pathologic condition.

All conscious sensations are cerebral. Vertigo is a disturbance perceived within the brain, just as taste or smell. If a disturbance of any organ is accompanied by vertigo it is because of a direct attack on the apparatus capable of producing vertigo. If the same condition fails to involve the ear and its pathways, there will be no vertigo. If a patient with vertigo gives an exaggerated reaction of normal character, it means that the patient is suffering from an irritation of the vestibular organ, either distally or centrally. This is usually toxic in character. The source of the toxicity may be a focal infection or a gastrointestinal toxicity or some specific disease, such as syphilis or any of the acute infections. If the patient gives an abnormal reaction it signifies an organic lesion. It is assumed that any toxicity may in time produce an organic change in the tissue involved. It has been proven beyond doubt that vertigo is not a "cerebellar pull," but the cerebrum's conscious effort to compensate.

The following classification of vertigo is, as far as we know, complete:

1. Involvement of the ear mechanism by a lesion in the ear itself. "Meniere's symptom complex" is due to a sudden destruction of the labyrinth by hemorrhage or by effusion into it, such as may occur in nephritis or diabetes or other conditions affecting the cardiovascular system. The usual symptoms of deafness, tinnitus, vertigo, staggering and, if severe, nausea and vomiting, are all explained by either a toxic irritation of the labyrinth or by cariodvascular disease producing anemia or hyperemia. Any inflammatory condition affecting the labyrinth gives the same picture in a varying degree. Slow

degenerative changes within the labyrinth cause attacks of vertigo from time to time.

2. Involvement by a lesion affecting the intracranial pathways from the ear. Lesions within the brain causing vertigo may be tumor, hemorrhage, thrombosis, infarct, abscess, gumma, tubercle, leukemic infiltration, specific neuritis, multiple sclerosis, syringomyelia, polioencephalitis and meningitis.

3. Involvement by ocular disturbances, either through the eye muscle nuclei or through association fibers from the cuneus to the cortical terminus of the fibers from the ear in the posterior part of the first and second temporal convolutions. This group includes all the cardiovascular conditions which produce either congestion or ischemia within the cranium.

4. Involvement by toxemias from any organ or part of the body. This group includes ptomaine poisoning, alcoholism, chemical poisoning, such as lead, quinin, salicylates, the toxemia of nephritis, rheumatism (focal infections), syphilis, infectious fever, such as mumps, scarlatina and typhoid fever. These toxemias may be grouped in two classes: (a) Evanescent toxemias, which have caused no degeneration of the cellular elements within the ear or the nerve pathways. This constitutes a large group of the cases of vertigo seen by the practitioner. (b) Toxemias which have caused a definite damage to the internal ear or its nerve extensions, such as in mumps or syphilis, or repeated attacks of a milder toxin, such as from gastrointestinal conditions or focal infections.

In aviation we have a practical example of the function of the ear in maintaining equilibrium. It is not necessary for an individual to have a perfect muscle sense, perfect sight and a perfect kinetic static sense in order to have an equilibrium sufficiently good to take care of the ordinary pursuits of life. In aviation, however, it is imperative. When flying above the clouds or in the dark the sight sense is of no avail, and the muscle sense in an unstable and moving machine affords little or no sense of balance. It is essential, therefore, that the aviator have a perfect vestibular apparatus, as it is upon this alone that his balance when flying depends. Some of the unexplained accidents in aviation are very likely due to a sudden concussion of the internal ear from the deafening roar of the motor or by a decrease in the air pressure at great heights. In a rapid ascent from a denser to a rarer air there occurs an oxygen insufficiency which has a direct effect on the ear mechanism through the blood stream. Unquestionably many an aviator has gone to his death because he did not know that he did not possess a normal internal ear. The United States was the first nation to appreciate the need of the neurootologic examination of aviators. During the late war this branch of the service was very highly and efficiently developed. The world owes a great deal to Isaac Jones of Philadelphia, not only to his pioneer work in this field during the war, but as well to his original researches and contribution to neurootology for the past few years.

Seasickness or mal-de-mer is a phenomenon resulting from the movement of the endolymph within the internal ear. As long as man has traveled by water, seasickness has been a source of distress to thousands of travelers. It would be impossible to enumerate the theories advanced for the cause of the malady, and the remedies have been as numerous as the theories. With the discovery of the physiology of the kinetic static labyrinth and a study of the reactions attendant upon stimulation of this organ the true etiology of seasickness was evident. The first symptom of seasickness is dizziness, which is followed by staggering on attempting to move. The face becomes flushed and soon is changed to a pallor, followed by nausea, and if the condition continues, by vomiting. This is entirely due to the endolymph movement brought about by the motion of the ship. This is the same picture obtained by douching the ears. Women are more susceptible to seasickness than men, little children are very little affected and infants not at all. This corresponds with our experience following douching. Infants never vomit, no matter how long the ears are douched. The vestibular organ of infants is not fully developed, which accounts for the absence of this reaction. From repeated experiences most people develop what may be termed an immunity to seasickness, which is also true of repeated stimulation by artificial means. An individual who cannot be nauseated by the examination of the vestibular apparatus will not become seasick.

The ordinary endolymph movements, such as accompany the usual pursuits of life, are responsible for our body balance because the brain through countless repetitions has learned to interpret the significance of these movements. When the movements become unusual the brain cannot interpret them and confusion and vertigo result. If the unusual movements recur frequently the brain learns to interpert them and vertigo no longer occurs, hence immunity to seasickness. The mechanism of vomiting is chiefly through the vagus and phrenic nerves. Nausea is a different reaction and is the cerebral interpretation of the unusual stimulus. Cumulative nausea may produce vomiting by a motor impulse from the cerebral cortex to the nuclei of the vagus and phrenic nerves. Besides the cerebral impulse we have association fibers directly from the ear to the vagus and phrenic. The vestibular nerve enters the posterior longitudinal bundle, which in turn is directly connected with the vagus nucleus. Other vestibular fibers enter the medulla and descend to the motor cells of the anterior horns of the spinal cord. The phrenic nerve has its origin in the cells of the anterior horns of the second, third and fourth cervical vertebræ. It is thus that the impulse travels direct to the vagus. Certain olfactory and visual impulses are contributing factors in overcoming the cerebrum's attempt to keep from vomiting. We may, of course, have nausea and vomiting without endolymph movement. If one could place himself in such a position that the motion of the ship would cause endolymph movement only in the horizontal plane there would be no seasickness. Unfortunately this is impossible, as the ship movements are in more than one plane. However, the seasickness is often mitigated by lying in the plane of the greatest movement. Any treatment or drug that will lessen nerve irritability will tend to lessen the seasickness. By a vestibular examination we can determine if an individual will become seasick.

It is well known that the toxin of syphilis has a predilection for the eighth nerve, and oftentimes this will be a very early manifestation of the disease. In any stage of the disease it will often be the first part of the nervous system to become involved, and this may occur in the entire absence of any other clinical evidence of the disease. In the past we have had to depend upon the functional tests for hearing to detect the presence or absence of eighth nerve involvement. At the best this is uncertain, and its unreliability has placed this method of diagnosis in ill repute. In the examination of the labyrinth by the Barany method we have an objective measurement of the degree of function of the eighth nerve. The following data may be presented as an aid in the diagnosis and treatment of syphilis. In the absence of the microscopic diagnosis of the initial lesion, or a Wassermann reaction, we can by these tests detect a slight diminution of function of the eighth nerve and by repeated examinations detect a progressive condition. In this way we may gain information that is suggestive in the presence of an uncertain Wassermann. We may detect by this means a lesion of the eighth nerve or the central nervous system which might not be evident for some time. In some cases this has been demonstrated years before any clinical evidence, and in the presence of a negative spinal fluid Wassermann. The early diagnosis of syphilis of the central nerve system is so important that the use of this means of diagnosis cannot be too strongly urged. We may demonstrate this before gross changes have taken place and while there is still hope of therapeutic help.

Recurrence of syphilis of the central nervous system is very insidious. The blood and spinal fluid Wassermann may be negative. The inconvenience of repeated spinal fluid examinations for control of recurrences is such that it is often not done, but this method affords an opportunity for repeated tests without discomfort or inconvenience to the patient. We may also by repeated examinations during the course of treatment of syphilis of the nervous system determine the efficiency of the treatment. We know how difficult this measure is by the usual means. If the patient is not cured the vestibular examination of the central nervous system will accurately reveal it.

The value of the eye examination to the neurologist has long been recognized. Based on opinions of neurologists and ophthalmologists who have had experience with the Barany examination, it is safe to say that the ear examination affords as a rule more definite and exact information than the eye. In Vienna no neurologic examination is considered complete without a vestibular examination. The ear tests are very valuable in making differential diagnoses between labyrinth and intracranial lesions and in furnishing additional data for intracranial localization. Nystagmus and vertigo, often associated with nausea and vomiting, may be due to either a labyrinth lesion or an intracranial lesion. In many instances the symptoms of internal ear disturbance and cerebellar lesion are identical. It is in such cases that the ear tests are valuable.

A differential diagnosis between peripheral and central lesions by means of the ear tests depends on certain general principles. A peripheral lesion of the labyrinth or eighth nerve is suggested by the following:

1. An impairment of the function of both the cochlear and the kinetic static labyrinth. If the examination of the hearing shows cochlear deafness, and the tests of the semicircular canals show that their function is also impaired, it immediately becomes probable that we are dealing with an end organ lesion.

2. The history or presence of tinnitus is evidence of labyrinth involvement, but its absence does not mean an unimpaired labyrinth.

3. Proportionate impairment of the responses from the horizontal canals and of the vertical canals indicates labyrinth involvement.

4. Proportionate impairment of both nystagmus and vertigo from the horizontal canals and normal responses from the vertical canals indicates a lesion involving the fibers from the horizontal canal in the eighth nerve or in the horizontal canal itself. It is the proportionate impairment of responses that speak of an end organ lesion.

A central lesion is suggested by the following:

1. Normal cochlear, but impaired or nonresponsive semicircular canals.

2. Normal responses from the horizontal canals, but absent responses from the vertical canals.

3. Normal responses from the vertical canals, but absent responses from the horizontal canals.

4. Normal vertigo, but impaired nystagmus from the horizontal canals.

5. Normal nystagmus, but impaired vertigo from the horizontal canals.

6. Normal vertigo, but impaired nystagmus from the vertical canals.

7. Normal nystagmus, but impaired vertigo from the vertical canals.

8. Normal vertigo and normal nystagmus from any semicircular canal, but impaired past pointing in any direction of any extremity.

9. Normal vertigo and normal nystagmus from any semicircular canal, but an impairment or absence of normal falling.

10. Spontaneous vertical nystagmus is pathognomonic of a central lesion and is indicative of involvement of the brain stem caused either by infiltration or pressure. A lesion of the labyrinth may produce many forms of spontaneous nystagmus, horizontal, rotatory, oblique or mixed nystagmus of these types, but an ear lesion can never produce a spontaneous vertical nystagmus, either downward or upward.

11. If there exists a spontaneous nystagmus to the right and nonresponsive semicircular canals of the right ear, an intracranial lesion is suggested. The nonresponsive labyrinth, if the labyrinth alone were responsible, would produce a nystagmus to the left.

12. A spontaneous nystagmus of increasing intensity or of long duration is indicative of a central lesion. A spontaneous nystagmus due to a lesion of the labyrinth shows its greatest intensity at the onset of the disease, becoming less and less marked and disappearing after a few days.

13. If the stimulation of any semicircular canal produces a perverted or inverse nystagmus, it is pathognomonic of a central lesion and is indicative of a brain stem involvement. Such phenomena as the following are frequently seen: Douching the right ear with cold water, with the head back, thus stimulating the right horizontal canal, should give a pure horizontal nystagmus to the left. If on such stimulation there occurs a vertical nystagmus upward or downward, a rotatory, oblique or mixed nystagmus, it may be spoken of as a perverted nystagmus. If instead of a horizontal nystagmus to

the left there is produced a pure horizontal nystagmus to the right it may be termed an inverse nystagmus. Neither a perverted nor an inverse nystagmus can possibly be produced by a lesion of the labyrinth or eighth nerve. A peripheral lesion produces a poor nystagmus or no nystagmus, but an absolutely false response of necessity demonstrates a central lesion.

14. If the ear stimulation produces a conjugate deviation of the eyes instead of nystagmus, it is pathognomonic of a central lesion.

The above outline indicates how additional data may be furnished to the neurologist by the labyrinth examination in determining whether he is dealing with a lesion of the internal ear, the eighth nerve, the brain stem or the cerebellum. In the broad field of brain localization the examination of the internal ear is also of distinct value. The particular feature of the ear examination is that the aurist sends in a stimulus to the brain centers and then notices the responses of the different parts of the body to this stimulation. If the ear and its nerve pathways are all intact the responses will be normal. If there is a failure of any or all of the responses, it is positive evidence of an interruption along that particular path or paths, that fails to bring about these responses.

In order to utilize the knowledge obtained from these tests it is essential to bear in mind the various pathways constituting the vestibular apparatus. The horizontal canal fibers after entering the brain stem have a different course from the fibers from the vertical canals. Each tract divides into two tracts, one the vestibuloocular tract, responsible for nystagmus, and the other the vestibulocerebellocerebral tract for vertigo. By determining the specific tract or tracts which fail to respond we can locate the site of the lesion. In order for the data to be reliable it is essential that the technic of the examination be accurately and painstakingly carried out. The ear examination is not for the purpose of making a neurologic diagnosis, but merely to give additional information, by a series of refined experiments, to be added to the knowledge obtained by the neurologist by other methods at his command. In the cases which the neurologist finds no difficulty in making a diagnosis it is useful in providing an additional evidence in corroboration. In the obscure case the neurologist may find the ear tests to provide the most accurate information obtainable.

The diagnosis of the precise location of a lesion within the cranium is probably the most difficult task with which the surgeon is confronted. Realizing this, he avails himself of every modern aid and diagnosis, such as the laboratory and spinal and corpus callosum punctures and the refinements developing therefrom, such as oxygen injections, pressure measurement and the analysis of the fluid withdrawn and the X-ray. For many years past no surgeon would consider doing an intracranial operation without an eye examination. We have previously shown the value of the labyrinth examination in differentiating between labyrinth and intracranial lesions. A point worthy of emphasis is that with the aid of these tests he is frequently enabled to determine whether a lesion is operable or not. Many lesions of the medulla, pons or cerebellar peduncles, which are inoperable by the very nature of their location, will show pronounced cerebellar symptoms, and not infrequently the cerebellum is exposed in such cases in the hope of finding a lesion near the cortex and removing it. For such a differentiation, in many cases, no method so far developed equals the Barany tests. If after turning and douching there appears a normal past pointing of both extremities in both directions, it may safely be assumed that the cerebellum is intact. This cannot be regarded as absolutely final, but is much more definite than any other known method for determining the integrity of the cerebellum.

Tumors of the cerebellopontine angle either originate from one of the cranial nerves in the angle, usually the eighth nerve, or have invaded the angle secondarily from the cerebellum or brain stem. The eighth nerve is usually involved in these cases, and our study of the eighth nerve gives a direct insight as to the condition in the cerebellopontine angle. In addition, the ear tests usually demonstrate the two following phenomena in cases of cerebellopontine angle tumor:

1. An absence of all responses from the vertical canals of the ear opposite the lesion. Given a tumor of the right cerebellopontine angle, the usual findings are as follows: The

right ear gives no responses, the cochlear showing an absence of all function and the stimulation of the horizontal canal and the vertical canals failing to produce any nystagmus, or vertigo, or past pointing or falling. The left ear shows unimpaired hearing and the horizontal canal normal nystagmus, vertigo, past pointing and falling. The vertical canals, however, fail to produce any response because the vertical canal fibers are most probably impaired owing to pressure upon the pons by the tumor of the angle.

2. Crossed past pointing. This phenomenon consists of persistent past pointing of both upper extremities either outward or inward, regardless of the ear stimulation employed.

In the examination of head injury cases we are able to be of considerable assistance. If the injury involves the labyrinth, as is so often the case, we can determnie accurately the extent of the damage and give an accurate prognosis. In another group of head injury cases in which the intracranial hemorrhage is the main factor in producing a serious intracranial condition, we have found a very consistent picture in our neurootologic examination. In this group the blood, regardless of the seat of the injury, gravitates to the posterior fossa above the tentorium and, filling the fossa, overflows through the incisura tentorii, into the fourth ventricle. The examination of a very considerable group of such cases has given consistent vestibular findings. Stimulation of the vertical canals gives no responses whatever. We have an absence of vertigo and nystagmus showings that the stimulation does not go through. Stimulation of the horizontal canals gives either a normal reaction or, if the hemorrhage is large, a diminished vertigo, but a normal nystagmus. In other words we have a central blocking of the passage of the stimulus. The interpretation of the above findings locates the obstruction in the fourth ventricle. The vertigo which we have in these cases is explained by the vestibular examination. The prognosis is good in most cases, as compensation occurs and the patient does not have vertigo under ordinary circumstances. The vestibular examination may be made use of in helping to determine the advisability of surgical intervention in these cases. If the vestibular findings are normal it means that there is not sufficient hemorrhage to cause the condition above described. In the absence of blood in the spinal fluid and no increase in the pressure, a normal vestibular examination adds weight to the surgeon's decision of nonsurgical treatment.

If the ear stimulation produces normal nystagmus, vertigo, past pointing and falling, the Barany tests are of unquestioned value in eliminating a lesion in the posterior fossa and brain stem. If they render no other service than this it would be sufficient to make them a distinct contribution in the diagnosis of intracranial lesions. In addition they may prove helpful in preventing unnecessary operation. In fact, no operation on the brain should be undertaken without giving the patient the benefit of the ear examination.

The intimate relation between the ear and the eye can best be appreciated when we realize that the ocular mechanism constantly depends upon stimuli from the ear for precision of movement. Steadiness of fixation is dependent to a large extent on normally functionating ears. Tonic impulses from the right ear, for example, continually tend to draw the eye to the left. This is proven by a sudden loss of function of the right internal ear, which invariably results in a deviation of the eyes to the right because the tonic impulses tending to draw the eyes to the left are impaired and there is a resulting nystagmus to the left. The same is true of the left side, only in an opposite direction. This may be further demonstrated experimentally by electricity. By applying the anode of the galvanic current to the right ear, which depresses the function, there results a drawing of both eyes to the right, with resulting nystagmus to the left. By applying the kathode, thus stimulating the right ear, the opposite phenomenon results. It is thus shown that ocular equilibrium, just as bodily equilibrium, is normally dependent on properly functionating ears. Artificial stimulation of the ears will produce to order any type of nystagmus. The laws governing these phenomena are invariable and simple. For example, if we wish to produce a vertical nystagmus upwards, we place the patient's head over towards the right shoulder, turn him to the left and we have a vertical nystagmus upward. The fistula test also serves to illustrate. If there is a caries of the bone in the outer wall of the labyrinth or a movable stapes, applying pressure or suction in the ear canal causes nystagmus. The tests have a practical value to the ophthalmologist in studying ocular palsies and spontaneous nystagmus.

In studying ocular palsies it is important to note that the ear stimulation is much stronger than the voluntary cerebral stimulus. If a patient is unable to look to the right with the right eye, the question arises as to the origin of the involvement of the sixth nerve. If ear stimulation causes the eye to move outward it is evident that the sixth nerve is not completely destroyed. This makes for a refinement of the determination of the degree of paresis and aids in the prognosis. The horizontal canal ocular fibers go to the sixth nerve, which supplies the external rectus and that part of the third nerve which supplies the internal rectus. If appropriate stimulation is applied it will show, in many cases, that the patient's inability to look to the right or left is due to only a partial impairment of the sixth nerve. The same will apply to tests for paralysis to the right or left or upward or downward. Loss of conjugate deviation in various directions should always be studied by means of the ear tests. If there is a loss of voluntary control and the patient when asked is unable to look in a given direction with either eye, and the ear stimulation causes the eyes to move in this direction, it shows without question that there are normal pathways from the ear to the eye muscle nuclei, and through the nerves of the eye muscles themselves, and that the lesion is supranuclear.

The Barany tests have taught us much that we did not know about spontaneous nystagmus. In a given case of spontaneous nystagmus, the first problem is to determine its type. Is it ocular or vestibular? If the oscillations of the eyeball consist simply of a to and fro roll, similar to the swinging of a pendulum—that is, the movement or roll in one direction is just as long and just as rapid as in the other, then it is of ocular type and suggests some local eye disturbance. It may be due to any condition that prevents the rays of light from pursuing an uninterrupted course through the various ocular media, such as corneal scars or anterior polar cataract. It is the effort to look around the obstruction. Ocular nystagmus may also result from interference with the proper action of the rays of light at the macula, provided the lesion occurred before central fixation was established.

In sharp contrast to the foregoing, if the movement of the eyes exhibit a definite rhythm, slow in one direction followed by a quick movement or recoil in the opposite direction, the nystagmus is of the vestibular type and due to an abnormal mechanism and not a lesion in the eyes themselves. It can be produced by a lesion affecting any of the pathways between the ear and the eye muscle nuclei, either within the ear or within the cranium. Such a nystagmus is not due to an attempt at fixation but to a disturbance within the nuclei themselves or through impulses from the ear to the eye which cause the eye to deviate to one side. When the eyes are thus drawn to one side, impulses from the cerebrum to the eye muscle nuclei quickly pull the eyes back in the opposite direction. The slow component is due to irritation, impairment or destruction of the pathways from the ear to the eye muscle nuclei, whereas the quick component results from the attempt of the cerebrum to correct the altered position of the eyes.

The cause of ocular nystagmus is readily determined by an eye examination, but it is those cases in which the lesion lies not so near the surface that the ear tests are absolutely essential. No case of vestibular nystagmus can be considered to have had a proper examination without the ear tests.

The importance of the examination and study of the cochlear portion of the labyrinth is accepted by all otologists. That the kinetic static portion of the labyrinth is equally, if not more, important is not yet recognized by all otologists, or at least is not practiced by even a small percentage of them. An examination of the internal ear is certainly not complete if only a portion of it is examined. The examination and study of the kinetic static labyrinth and its pathways is just as much a part of otology as the examination of the cochlear portion. It is a misconception to regard the examination of the kinetic static labyrinth as difficult to make and hard to understand and interpret.

The entire physiology of these ear tests may be summed up as follows:

1. The eyes are always drawn in the direction of the endolymph movement.

2. The vertigo is always in a direction opposite to the endolymph movement, and past pointing and falling are always in a direction opposite to the vertigo.

By knowing these laws the otologist is master of the physiology of the subject. By making this method of examination a regular part of his practice the otologist may enlarge his field of usefulness and add great interest to his work. In the routine examination of the ear the otologist is constantly confronted with cases of deafness in which the significance of the tuning fork tests is obscure and inconclusive. By determining an involvement of the kinetic static portion of the internal ear he has at once presumptive evidence of a similar impairment of the cochlear portion. The accepted method of examination for the function of the cochlea depends on the honesty, the intelligence and cooperation of the patient, while the Barany tests of the internal ear presents objective evidence of the function of the kinetic static portion of the eighth nerve.

In the routine examination it is not necessary to make all of the tests. Merely turning the patient to the right or to the left will give sufficient information to determine the necessity for further elaboration. This can be done quickly and without any disagreeable result to the patient.

When the otologist is confronted with surgical problems of the internal ear itself, as in inflammatory conditions of the labyrinth resulting from the extension of a suppurative process in the middle ear, it is generally recognized that the turning and caloric tests, and occasionally the fistula test, are indispensable in determining the nature and degree of the involvement. The tests are the only means by which the aural surgeon can determine whether an operation on the labyrinth is necessary or whether the vestibular symptoms produced by the nonsurgical affection result from a lesion of the labyrinth itself or along the intracranial nerve pathways from the internal ear. Such a differentiation can only be made by the Barany examination and such is the otologist's problem. Vertigo is essentially an otologic study, and every otologist should be prepared to analyze such cases. In the same way he should always be prepared to give the necessary information to the internist, the surgeon and the neuroolgist as the possible location and the differentiation from an internal ear and an intracranial lesion.

In the foregoing presentation of the subject of neurootology text books and the current literature have been freely drawn upon. The section on head injury cases is, as far as the writer knows, entirely new. A separate treatment of this phase of neurootology will be presented in the near future.

121 St. James Pace.

LXXX.

BARANY TESTS IN SUPRATENTORIAL TUMORS PROVED BY OPERATION OR NECROPSY.*

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INTRODUCTION.

A slow but sincere scientific interest, a steady increase in knowledge and an indefinite amount of discussion are embodied in neurootology in general and in the Barany tests in cases of supratentorial tumor in particular. Early the neurologist looked on neurootologic localizations of intracranial lesions with interest but also with reservation. These limitations are being eliminated and will be steadily eliminated as our knowledge from proved cases multiplies. The localization by Barany tests of supratentorial tumors is one of the later developments of neurootology.

A Barany test is indicated in all cases of vertigo, but is especially useful in all lesions of the central nervous system. In performing this test it is essential that the turning and the caloric tests are not made consecutively, because the responses are modified after repeated stimulations of the semicircular canals. It is also useful for productive work that the intracranial localization of a lesion by this test is made independently and without knowledge of the neurologic localization. A report of nine cases in which the test was made follows:

Case A236828. Miss S. L., aged 40, was examined July 2, 1918, chiefly because of dull frontal headaches and loss of strength. The patient's family and personal history are negative. The patient had always been well until one morning in October, 1917, while combing her hair she felt a sudden jerk in the left arm and it immediately became numb and powerless. Severe and almost continuous frontal headaches began at this time. Projectile vomiting often followed the headaches and somewhat relieved them; the left hand improved slightly. Partial deafness, which had existed since childhood, increased. The patient's limbs jerked when she was lying down.

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Physical examination: The weight, blood pressure, urine and blood counts were normal. The eyes showed double choked discs of three diopters. The blood Wassermann test was negative. The spinal fluid Wassermann tests with 0.4 and 0.55 cc. were negative. The Nonne reaction was positive.

Neurologic examination, July 4, 1918: The neurologic examination was rendered difficult by the somewhat clouded mental condition of the patient. A nystagmus was noted. The cranial nerves were otherwise practically normal, with the exception of bilateral choked discs of about three diopters. Movements of the left arm were awkward as compared with those of the right. The reflexes were normal throughout, save for a slight diminution of the left abdominal reflexes. With the exception of a moderate loss of joint sensation of the left toes and an almost complete loss of joint sensibility in the left fingers, with corresponding asterognosis, sensation was normal throughout. No other significant changes were noted. A neurologic diagnosis of a tumor of the brain, located probably in the postcentral gyrus of the right side, was made.

Barany test: A Barany test revealed a moderate combined type of deafness, a bilateral spontaneous horizontal nystagmus and a spontaneous pointing fault with the left arm. The turning test showed prompt reactions throughout. The caloric test revealed, on the right, a marked and definite exaggeration of all responses from all the canals. Nystagmus began almost at once; with the test of the left verticles it was of a perverted type, with vomiting and marked vertigo which was early and severe on the right also. A pointing fault was exhibited by the left arm. Falling was to the left. The horizontal canal showed marked reactions throughout. The reactions from the left canals, which showed interference with the posterior longitudinal bundles and the middle peduncle on the same side were interpreted as pressure signs. The diagnosis from the Barany test (Chart 1) was a supratentorial lesion on the right side, causing pressure downward.

July 16, 1918, a glioma of the brain 5 by 10 cm., weighing 63 gm. (Fig. 1), was removed from the right frontomotor area.

January 16, 1920, when the patient returned for examination, she was normal mentally and had control of the left arm.

Case A235175, Mrs. R. P. O., aged 47, came to the clinic June 14, 1918, walking but in the need of considerable support. The patient's father died of an accident; her mother is 78 and in good health. Two brothers are in good health and two died of typhoid fever and scarlet fever, respectively. One sister is well. One daughter, sixteen months of age, died of sarcoma of the kidney. The patient's menstrual history was not unusual. The last period was in March, 1918; previous illnesses were also unimportant. Her chief complaint was inability to walk for the past two and one-half years. She felt physically weak and mentally tired. Eight months' rest in a sanatorium had not especially benefited her. She had intense bilateral, frontal and occipital headaches. Early in December, 1917, the patient was in coma for three days, then became markedly apathetic and entirely lost her memory for past incidents. Early in the spring she again went to a sanatorium for six weeks and was somewhat improved, but on returning to her home her condition became worse. She had involuntaries and urinary frequency with loss of control of the sphincter.

Physical examination: The patient's weight was 175 pounds, 30 pounds above normal. Her left pupil was larger than the right. She had a double choked disc of about three diopters right and one to two diopters left. There was a moderate blurring and loss of detail about both discs. Reflexes were normal. The Wassermann and Nonne tests on the spinal fluid and the Wassermann test of the blood were negative. The lymphocytes were normal. The routine urine and blood examinations and the combined phenolsulphonephthalein test were all negative. A roentgenogram of the head showed an apparent thickening of the base of the sella with obliteration of the posterior clinoid process.

Neurologic examination (June 14, 1918): Neurologic examination revealed the following status: Vision was 6/6 in both eyes; there was a moderate blurring and loss of detail around the edges of both discs, suggesting a pupillitis; the visional fields were practically normal. The left pupil was slightly larger than the right, with slight impairment of reaction to light in the former, and considerable impairment in the latter; reaction to accommodation was normal. There was a nystagmus on looking toward the right. The tendon reflexes were all moderately increased; the abdominal reflexes could not be elicited; however, the patient was obese and the abdominal walls flabby. The patient walked on a rather wide base and gave the impression of being very feeble. There appeared to be some dementia; the patient asked the same questions repeatedly, raised numerous objections to the examination, and cooperated very poorly. The spinal fluid tests were negative.

The patient was sent home to be cared for by a local doctor and asked to report by letter frequently. Her condition became definitely worse; when she returned January 31, 1919, projectile vomiting was more frequent than at the time of the first examination, consciousness was decreased, and double choked discs were increased to four diopters.

Neurologic examination (January 31, 1919): There were now definite bilateral choked discs and a nystagmus. There was a marked general weakness, particularly on the right, with a corresponding increase in muscular tonicity. The tendon reflexes were all greatly increased, the abdominal reflexes were absent, and there was a strongly positive Babinski phenomenon on the right and one doubtfully positive on the left. The mental condition was decidedly clouded, attention being too poor to make a detailed examination.

A diagnosis of brain tumor, probably located in the left frontomotor area, was made.

Barany test: The Barany test presented one of the interesting phenomenon syndromes of supratentorial tumors (Chart 2). There was no cochlear fault in either ear, nor was there any spontaneous nystagmus. The patient was in the hospital under observation. She was unable to raise her arms, due mostly to her dementia, but somewhat also to her weakness. A turning test, therefore, was impossible.

Two features were prominent in an analysis of the caloric test, first, much exaggerated vertigo and falling, and second, absence of nystagmus from the right verticals. Pointing tests were impossible. This indicates the supreme test in the ability to interpret a Barany syndrome. The marked vertigo and falling suggest a lesion above the stem, but in this case the stem itself gave an abnormal response. The explanation is clear and in accordance with facts.

The most striking effects of supratentorial tumors or, in fact, of any brain tumor, are those of pressure. This we know may cause symptoms due to injury to remote parts of the brain, for example, a lesion above the stem may, due to its pressure, cause a paralysis or paresis of the sixth cranial nerve, resulting in a paralysis or paresis of the external rectus muscle of the eye. Similarly an enlargement of the sella turcica or an absence of the posterior clinoid process is shown by the roentgenogram. These two facts have been proved definitely in a large number of cases. The pressure in this case exerted not only a rather typical exaggeration of vertigo and falling, but also the effect of the pressure from above downward, resulting in a brain stem syndrome partially involving the posterior longitudinal bundles. From the Barany, therefore, a diagnosis was made of a supratentorial tumor in the left cerebral hemisphere.

At operation, February 8, 1919, a subcortical tumor was found in the left frontal lobe, 2.5 cm. below the surface of the cortex, involving the middle and lower frontal convolutions.

Case A233010. Mr. A. St. L., aged 48, came to the clinic October 13, 1919, because of fits which began eighteen months before. The condition affected the right foot and arm and the head, occasionally the left side. Sometimes the attacks were followed by unconsciousness. The attacks were tonic in nature, started from the foot on the right side and passed up the same side, the head turning to the right. The fits lasted about ten minutes. The attacks were often preceded by an electric shock throughout the body. Formerly they occurred about every three weeks, at the time of examination once in seven weeks. The patient had severe frontal and occipital headaches, often lasting three days, and he complained of diplopia and tinnitus. He did not bite his tongue or froth at the mouth. He was rather dull intellectually and slow to answer questions. Sixteen years before in an explosion of dynamite a board had struck him in the left occipital region, but this had not appeared to give him any trouble.

Physical examination: The patient's pupillary reflexes were sluggish. His body was erupted with marked pigmentation. He had a bilateral choked disc of two diopters in the right eye and of one diopter in the left. The routine examinations showed the blood and urine to be normal. The blood and spinal fluid Wassermann tests were negative to 0.4 cc. of fluid. The Nonne was positive; there were five small lymphocytes.

A roentgenogram of the head failed to reveal the sella, but a suspicious area of erosion was found in the occipital region. The patient's temperature was normal.

Neurologic examination (January 31, 1920): The patient was found to have normal vision, choked discs of two diopters on the left and one on the right, the right pupil slightly larger than the left, and a slight diminution in all the pupillary reflexes. Examination of the other cranial nerves was negative. Weakness was general, but there was not any evidence of local impairment in muscular power. Coordination was moderately impaired on the right side in both the arm and the leg, and very slightly impaired on the left. The gait suggested an ataxia, and the Romberg test was slightly positive. Sensation, including sterognosis, was normal. On rest and on static innervation a coarse rapid tremor appeared in the right arm. The tendon reflexes were all moderately increased but equal on both sides. The abdominal and plantar reflexes were normal. The sphincter control was normal. Spinal fluid examination gave a negative Wassermann test, a positive Nonne, and five small lymphocytes to the cubic millimeter. The patient was strikingly sluggish mentally and indifferent in his cooperation during the examination. A roentgenogram of the head showed the outlines of the sella to be very indistinct.

A diagnosis of a brain tumor, probably of the left frontal lobe, was made, and exploration advised.

Barany test: The Barany test was very interesting. The turning was not done, because the patient was quite sick. The caloric test showed that the nystagmus time from the right vertical canals was markedly delayed. Vertigo was normal. There was no falling, and the pointing was reduced. The right horizontal canal showed increased pointing. Obviously, the turning was not necessary in this case, and a diagnosis was made of a left supratentorial tumor which was producing pressure signs on the right hemisphere (Chart 3).

The patient was operated on November 27, 1919, and a large osteoplastic flap was turned on the left temporal area. Profuse bleeding was encountered, the dura near the midline bleeding freely. The ventricle was entered twice with a trocar, but only a few drops of fluid escaped. In making the stabs it felt as if there was a tumor under this area of the dura; the dura was incised and a tumor measuring 7 cm. by 5 cm. was found, very closely adherent to the dura but encapsulated on the brain side. Enucleation was difficult and bloody, a large portion of the dura, about 4 cm. in diameter, was excised attached to the tumor (Figs. 2 and 3), which extended up to the midline and made pressure on the flax cerebri. The longitudinal sinus was probably entered, as there were marked venous hemorrhages which required packing. The excavation in the brain was filled with animal membrane held in place by a silk suture. The operator noted that a cerebral hernia would develop due to the dural defect.

The patient recovered and had a resection of the small cerebral hernia. The tumor, 6 cm. in diameter, on pathologic examination, was shown to be endothelioma.

The findings in this case were definite and instructive. The exact localization of the lesion was made from the caloric test alone. The pressure signs on the left hemisphere were verified by the location of the tumor. The patient had no convulsions after operation and feels considerably stronger.

Case A241430. Mr. H. H. W. H., aged 31, came to the clinic August 7, 1917, with a history of the onset of headaches in August, 1916, and shortly thereafter numbness of the left foot which gradually extended upwards. He fell and a convulsion followed. His left leg and arm were cramped badly. He bit his tongue and frothed at the mouth. These spells occurred during the day and lasted about fifteen minutes. The symptoms were always the same, and the attacks became more frequent, sometimes coming every day.

The patient's grandmother was insane and his father a chronic alcoholic. The patient did not take stimulants. His mother and one brother were subject to severe sick headaches. He had two healthy children. He had had neisserian infections at the age of fourteen, sixteen and twenty-three. Since December 2, 1917, the patient had not worked, because he felt too weak and had the spells almost daily. There was a tinnitus in his right ear. He had taken bromids for the past few weeks and had not had an attack.

Physical examination: The patient was well nourished, weighed 132 pounds, and was 5 feet 6 inches tall. His speech was a little slow; the Romberg was positive. He had bilateral sensitive areas in both lower abdominal quadrants. His movements were a little unsteady and he responded slowly. His fundi were normal. The routine examinations of urine and blood, and the blood pressure tests were all normal. A test meal showed free hydrochloric acid of 68 and combined acid of 14. The blood Wassermann test and the spinal fluid Wassermann test in dilutions of 0.2, 0.3, 0.4 and 0.5 cc., the Nonne test were negative. There was one small lymphocyte. The roentgenogram of the stomach was negative. A roentgenogram of the head showed a calcified area in the right parietal area. The temperature was normal.

Neurologic examination (August 7, 1918): The neurologic examination was negative with the exception of nystagmus. There was a very slight diminution in tactile sensibility over the left foot, a marked decrease in joint sensibility of the left toes, a very definitely increased tendo achilles reflex on the left and bilateral absence of the abdominal reflexes. A roentgenogram of the head showed a calcified area in the right parietal region. The spinal fluid examinations were negative.

A diagnosis of migraine and Jacksonian epilepsy, due to a cortical lesion involving the foot center of the left rolandic area, was made and exploration advised.

Barany test: A Barany test was made and showed a spontaneous vertical nystagmus with the patient looking up and a nystagmus down on looking downward (Chart 4). A spontaneous pointing fault was present with the left arm. The turning revealed an exaggeration of vertigo. The caloric test presented a perverted nystagmus on stimulation of the right and left vertical canals. Also all verticals gave marked vertigo and a pointing fault for the right arm. The horizontal canals showed a pointing fault with the right arm. The perverted nystagmus obtained in this case was due to an interference in the posterior longitudinal bundles. This, like almost all similar reactions, shows a partial loss of function rather than a total absence, which is typical of the responses due to pressure. There was also a pointing fault for the right arm from all canals. At first glance, this would seem to indicate a cerebellar lesion, because the synergetic movements are controlled by this part of the brain. Such an assumption was wrong in this case for two reasons: first, because the pointing fault was only with the right arm, and second, because stimuli do get through and produce normal past pointing. This fault, therefore, is not due to a cerebellar lesion, but to an interference with the tracts leading to the hindbrain. Such an interference is explained by the effect of pressure on the middle cerebellar peduncles.

In this case the reaction consisted of exaggerated vertigo throughout all tests, perverted nystagmus from all vertical canals and a pointing fault for the right arm from all the semicircular canals. A Barany diagnosis was therefore made of a supratentorial lesion causing considerable pressure downward on the peduncles, stem, and posterior longitudinal bundles. It was impossible to designate the side.

August 22, 1918, a large right subtemporal decompression was made. The cortex was opened and a diffuse, firm tumor was found in the sensory area of the right hemisphere. It was not encapsulated. As it could not be removed, 50 mg. of radium were inserted. The tumor was firm and contained calcium.

Case A221019. Mr. J. A. M., aged 46, came to the clinic February 5, 1918. He had been rather nervous, especially during the past two years. He slept well. He used no stimulant except tea once a day. He had one healthy child, aged 17. When the patient was 23 he was injured in a railroad wreck, receiving three wounds on his head. He was unconscious for three hours and was in bed for three or four weeks. November 7, 1916, a tumor was removed from the back of his right thigh. The tumor was not examined pathologically nor preserved. December 9, 1917, a second operation was performed in the scar of the former operation, the details of which are uncertain, and a rectal operation performed for epilepsy.

The patient's clinical history centered around his epileptic spells. The first attack occurred October 21, 1917, the first premonition being temporary blindness, followed by twitching of the eyes. The patient cried out and fell over unconscious, in a generalized convulsion, accompanied by vomiting and frothing at the mouth. He was unconscious for one and one-half hours and awoke very tired and nervous. He had had about fifteen attacks in the last three months; the last one was ten days before examination. The attacks had become more frequent but less severe. The patient complained of gastric symptoms with belching of gas. About January 1, 1918, he had severe colic and upper abdominal pain, with vomiting for one and one-half hours. His bowels were regular and his appetite good. He had had almost constant severe headaches in the back of his head and behind the right ear, but frequently diffuse and bilateral since the onset of trouble. His vision was faulty, and he often found it difficult to touch his nose with his finger.

Physical examination: The patient walked to the clinic unaided. He was 5 feet and 9 inches tall and weighed 171 pounds; four months before he had weighed 200 pounds. There was a scar on his right thigh posteriorly with no signs of recurrence of the former tumor, which probably was a fatty tumor. The rectal and abdominal examinations were negative. He had a definite pyorrhea alveolaris. The systolic blood pressure was 108, and the diastolic 76. A twelve-hour specimen of 350 cc. of urine was acid in reaction and showed a specific gravity of 1021. All other macroscopic and microscopic tests were normal. Hemoglobin was 70 per cent. The red blood count was 4,448,000 and the white 9,400. The blood Wassermann test and the spinal fluid test in dilutions of 0.2, 0.3, 0.4 and 0.5 cc., using Naguche and Melange antigen, were negative. There were seven small lymphocytes in the spinal fluid. The Nonne test was negative. The blood cholesterol estimated in milligrams for 100 cc. by the Bloor I method was 0.400, and by the Bloor II method 0.444, a difference of 0.044. Roentgenograms of the head and chest were also negative. The temperature was 98.6. Examinations showed the ear, nose nasopharynx, throat, larynx and auditory acuity to be normal.

Neurologic examination (February 5, 1918): Both pupils were somewhat irregular. A slight nystagmus was noted. Vision was normal in both eyes, the fields showed no contraction, and the fundi did not reveal any evidence of pressure. The cranial nerves showed no abnormality, except that on smiling the patient wrinkled the left side of the face somewhat more than the right. The grip on the left, as tested with the dynamometer, registered 20, and on the right, 26. The power of the other muscles of the left arm and left leg was likewise very slightly less than that of the right. The tendon reflexes were somewhat more active on the left than on the right. The plantar response was flexor on both sides. Sensation was normal throughout. Coordination was normal on the right, but slightly impaired on the left. There was a very slight static tremor in the hands. Speech was slurring. The patient was considerably demented, so that cooperation was unsatisfactory. His handwriting showed no changes of significance. The spinal fluid reactions were normal.

The diagnosis was uncertain; however, exploration of the right motor area of the brain for tumor seemed justified.

Barany test: The Barany test (Chart 5) showed no spontaneous pointing faults, normal hearing, and no spontaneous nystagmus. The turning tests were normal except that the vertigo was unusually marked and accompanied by much nausea and retching. The caloric test revealed a rotatory nystagmus to the left of moderate amplitude on stimulation of the right vertical canals in thirty seconds. The pointing and falling tests were increased over normal. The responses from the right horizontal canal were increased, following the onset of a horizontal nystagmus to the left. On stimulation of the left vertical canals there was a rotatory nystagmus to the right of moderate amplitude in forty seconds. All tests and responses from these canals were exaggerated. Stimulation of the left horizontal canal produced a horizontal nystagmus to the left of moderate amplitude with the accompanying responses exaggerated.

The Barany test in this case is characterized by a generalized exaggeration of all responses without any reactions being absent or diminished. A diagnosis, from the Barany test, of a supratentorial lesion was made. It was impossible in this case to name the hemisphere. After a consultation with the neurologists, a final diagnosis of a tumor of the brain in the right motor area was made and exploration advised.

At operation, February 25, 1918, a nodular and moderately vascular tumor about 6 cm. in diameter was removed by blunt dissection from the right frontomotor area.

Case A246341. Miss D. D., aged 17, came to the clinic September 21, 1918, complaining chiefly of blindness and headaches. The patient entered the clinic walking, but directed by her father. Her grandfather and aunt on her mother's side died of tuberculosis; one aunt died of cancer. The grandmother and two sisters on the father's side died of tuberculosis. The patient since nursing at the breast had had attacks simulating petit mal, typhoid fever at six years of age, malaria in 1917, and repeated rheumatic attacks. Her menses began at twelve and were painful. In February, 1918, she had attacks of pain in the eyes and noticed that her vision was getting poor. Photophobia was marked. The patient frequently vomited when the headaches were severe, but the vomiting was not of the projectile type. She was relieved of this by lying down and closing her eyes. Sight began rapidly to disappear and was gone in ten days. It disappeared first in the right eye, which had pained her most. At the time of examination she could see only bright lights at night, and petit mal attacks were occurring two or three times daily.

Physical examination: The patient, whose family is inclined to obesity, weighed 227 pounds and was 5 feet and 6 inches in height. The examination revealed few abnormalities. Her entire abdomen was tender to touch. There was doubtful light perception in the right eye. The discs had swollen margins with complete secondary atrophy of the nerve heads. The vitreous contained many small stringy floating opacities from a low grade uveitis. The blood Wassermann tests in dilutions of 0.3 and 0.4 cc. were negative. The vaginal smear showed gonococci. There was a trace of albuminuria. The white blood cell count was 14,000. The other routine tests were normal. A roentgenogram of the head showed a calcified area in the right temporal region with evidence of intracranial pressure.

Neurologic examination (September 21, 1918): On neurologic examination a complete blindness from secondary optic atrophy, with a divergent strabismus, was noted. The pupils were dilated and did not respond to light. The patellar reflexes could be obtained only on reinforcement, and the tendo Achillis responses were considerably diminished. The plantar reflexes were uncertain but probably flexor.

A diagnosis of probable brain tumor, without definite localizing signs, was made.

Barany test: In carrying out the Barany test (Chart 6) turning was not done because of the patient's general physical condition. There was spontaneous bilateral horizontal nystagmus. The hearing test showed the high fork and the Schwabach test slightly reduced. The pointing was normal. In analyzing the caloric test we noted a prompt response in the nystagmus from all vertical canals. Vertigo was exaggerated in both instances, but much more on the left side than on the right. The pointing tests were questionable chiefly because the patient complained of vertigo and her cooperation was poor. However, a response with the left hand came through on stimulation of the right horizontal canal, and a lesion of the cerebellum was thereby eliminated. When the left canals were tested there was a tendency to hold the eyes to the left. The right cerebellum was considered normal, because a normal reaction was obtained. The Barany test showed, therefore, prompt nystagmus associated with exaggerated vertigo, falling, conjugate deviation of the eyes, and pointing faults, and the diagnosis therefrom was supratentorial tumor causing pressure on the stem and middle cerebellar peduncles.

November 1, 1918, a large subtemporal decompression was performed on the right side. Two and one-half centimeters below the surface a mass was found in the right cerebral hemisphere which contained yellow mucilaginous fluid. The tumor was not encapsulated and hence enucleation was not attempted. The patient recovered from the operation and went home.

Case A224782. E. S., a girl, aged 7, was brought to the clinic March 11, 1918. The child had had a bilateral frontal headache August, 1917, and had appeared dazed for ten minutes. After two months the headaches were more frequent and severe, and accompanied by projectile vomiting. The patient walked into the clinic without aid. She was the second child of a large family. She had had scarlatina at 3, pertussis at 5, measles and chickenpox at 7. A choked disc had been diagnosed in December, 1917.

Physical examination: The physical findings and laboratory tests were negative. The temperature was normal. Blood Wassermann tests on the child and parents were negative. The von Pirquet test was normal. A roentgenogram of the head did not aid in the diagnosis.

Neurologic examination (March 11, 1918): The neurologic examination showed the pupils to be moderately dilated; reaction to light was normal on the left, but on the right was followed by a secondary dilatation; vision in the right was 20/200 and in the left was reduced to the counting of fingers. There were bilateral choked discs. The mental condition was normal. Otherwise the findings were negative throughout. July 15, 1918, the patient developed a marked nystagmus, described in detail on the Barany sheet.

Barany test: The Barany test (Chart 7) revealed active nystagmus on turning, with absence of vertigo. The caloric test of the right canals showed an absence of vertigo and falling. On the left, however, an absence of nystagmus was obtained from the vertical canals accompanied by the absence of vertigo and falling. There was also a pointing fault for both arms. The right horizontal tract responded in a normal manner. A diagnosis was made of pressure from above on the midstem region, especially on the left, accompanied by a disturbance in the cerebellar tracts in the middle cerebellar peduncle on the left. A summary of the entire case revealed the pressure of an intracranial lesion without localizing signs. On account of the few findings it was decided to do a lumbar puncture every three to five days, withdrawing 8 to 15 cc. of fluid, and within a few hours to examine the fundi. This therapy had little effect and the choked discs did not change.

A right subtemporal decompression and exploration were done April 1, 1918; no tumor was found. The patient left the clinic but did not improve.

September 19, 1918, the patient returned. At this time she inclined toward the left in walking or sitting. She had involuntaries on awakening in the morning and on arising had a tendency to fall backward. She had tinnitus in the right ear. No loss of motion was noted, but she felt "dopey" all that day.

Neurologic examination (Sept. 19, 1918): The optic atrophy and loss of vision were complete. The pupils were dilated and reacted only to accommodation. Marked nystagmus was still present. Speed of voluntary movements was moderately reduced over the entire right side, although the co-ordination tests were practically normal. A tremor of moderate rate and small amplitude developed on movement. The plantar reflex by the Babinski method was extensive on the right and doubtful on the left. At times, particularly in the morning, there was a tendency to urinary incontinence. Percussion of the head did not reveal local tenderness and imparted a cracked pot resonance. No other significant abnormalities were noted.

A diagnosis of brain tumor was made; however, localization was by no means certain. The signs suggested a cerebellar involvement.

Barany test: A second Barany test (Chart 8) was made which presented very definite changes from the first. There were now a spontaneous bilateral horizontal nystagmus and vertical nystagmus on looking up. A spontaneous pointing fault with the left arm was also found. The right canals, on turning, gave a perverted nystagmus composed of a rotatory and horizontal nystagmus accompanied by a vertical nystagmus. There were also conjugate deviation of the eyes and falling to the right, without subjective vertigo. By stimulating the right vertical canals with cold water, a perverted nystagmus occurred in fifty seconds, consisting of a vertical and a left rotatory nystagmus. The stimulation of the horizontal canals produced a rotatory nystagmus to the left and conjugate deviation. There were also pointing faults with both hands. When the left verticals were similarly stimulated a perverted nystagmus began almost at once, consisting of a vertical, horizontal, and rotatory nystagmus to the left. There was no nystagmus found on stimulation of the horizontal canal. There was no subjective vertigo or falling. A pointing fault with both hands occurred when the horizontal canal was activated.

A diagnosis, from the Barany test, of a lesion in the right cerebral hemisphere, causing great pressure downward, was made.

The second Barany test shows very definitely the effect of prolonged and increased pressure on the stem, posterior longitudinal bundles, and on the middle cerebellar peduncles. The pressure was more intense on the right side, as evidenced by the perverted nystagmus and conjugate deviation which occurred on the right side only. This effect was also evidenced by the fact that the middle cerebellar peduncle on the right was interfered with to the extent that stimuli did not get through to the cerebellum. Evidences of marked pressure signs appeared through both Barany tests, especially the second.

After considerable deliberation a simple cerebellar decompression was performed September 20, 1918. The exploration revealed nothing. The patient died September 22, 1918, of a bilateral lobar pneumonia. Necropsy revealed a glioma of the right frontal lobe measuring 6 by 8 by 5 cm., just anterior to the explored area (Figs. 4 and 5).

Case A248887. Mr. E. B., aged 32, came to the clinic October 16, 1918. The patient's health had been good until March, 1918, when he began to have severe occipital headaches, more marked on the right side, often accompanied by vomiting. In April, 1918, weakness developed in the left arm and extended to the left leg. The weakness gradually increased until June, and the left side of the face became paralyzed. The patient had been a steady alcoholic until March, 1918. The family history was not important.

Physical examination: The physical findings were negative. The blood pressure, urine, and blood were normal. The blood Wassermann test and the spinal fluid Wassermann test with 0.3 and 0.4 cc. were negative. There was one lymphocyte. The Nonne was negative. There was no choked disc. The roentgenogram showed a very large sella and apparently a calcified pineal body.

Neurologic examination (October 19, 1918): Record was made of normal vision, an active bilateral neuroretinitis, a spontaneous nystagmus, a slight inequality in the size of the pupils, the left being somewhat larger than the right, and a pupillary reaction which was slow but of good amplitude. Rotation of the eyeballs upward was limited. The muscles supplied by the middle and lower divisions of the left facial nerve were slightly but very definitely weak. The left arm and leg showed a moderate weakness, with a corresponding diminution in speed and increase in tonus. Coordination in the left arm was somewhat impaired. The thigh-trunk sign of Babinski was positive on the left. The gait was that of a patient with a left sided hemiplegia. Touch and pain sensibilities were slightly diminished over the entire left side and moderately active on the right; the abdominal reflexes on the left were absent and on the right diminished; the plantar responses were normal. Attention and cooperation were very poor. The spinal fluid findings were negative.

The neurologic diagnosis was tumor cerebri of the right frontomotor area, probably subcortical and diffuse.

Barany test: A Barany test (Chart 9) showed a generalized hyperactivity of responses throughout, except the nystagmus from the right verticals. On turning, the responses of nystagmus were of decreased duration. The caloric test showed an absence of nystagmus on stimulation of the right vertical canals for three minutes; this was accounted for on the basis of pressure from above. The effect of pressure from above explains the absence of falling and the slightly reduced vertigo. The left vertical canals presented normal nystagmus time, but vertigo was markedly increased and associated with vomiting, thus giving evidence of exaggerated responses. Falling was to the left. Pointing was normal for all canals with the right arm, but absent with the left, due to the hemiplegia. Exaggerated responses, especially on the left, with pressure effect on the left brain stem, were present. This, in the presence of a definite hemiplegia, made the diagnosis absolute. The Barany report was the presence of a supratentorial lesion in the right cerebral hemisphere.

October 26, 1918, a cyst was removed from the right frontomotor area. The microscopic diagnosis showed the tissue to be that of a smooth walled cyst (Fig. 6).

Case A308888. N. K., a boy aged 10, was admitted to the clinic March 16, 1920. The patient had been well until October, 1918, when he developed a headache, followed by right side convulsions which continued several hours until chloroform was given. Occasional spells of unconsciousness occurred every week or two. In March, 1919, a blood test was made, and several salvarsan injections were given, followed by iodids and bromids. The child was entirely free from trouble for two months in the fall of 1919. In December he again had attacks of headaches, followed by unconsciousness. About six weeks before examination, pain in the right leg developed which lasted several hours. In February, 1920, a definite weakness of the right arm and leg and a limp were noticed, and the convulsions became more frequent and severe, with twitching of the right side of the face. The child had been unable to walk for the past week. He had had two tonsil and adenoid operations.

Neurologic examination (March 16, 1920): Choked discs of three diopters on the left and of two diopters on the right, with normal vision, were disclosed. There was a slight ptosis on the left. Muscular movements of the forehead and about the mouth on the right were diminished in strength. There was a marked right side hemiplegia. The tendon reflexes on the right were more active than those on the left; the superficial reflexes were normal. The patient had a very marked motor aphasia.

The neurologic diagnosis was tumor involving the left precentral area.

Barany test: The Barany test (Chart 10) revealed normal hearing and no spontaneous nystagmus. The caloric test of the right vertical canals showed a mixed type of rotatory and horizontal nystagmus to the left, of wide amplitude. Vertigo was exaggerated, as were the pointing tests for the left arm. The hemiplegia made all pointing tests with the left arm impossible. The right horizontal canal showed a horizontal nystagmus to the left of wide amplitude, with exaggerated past-pointing with the left arm. The stimulation of the left vertical canals with cold water revealed a rotatory nystagmus to the right of wide amplitude and of very prompt onset. Vertigo and past pointing were exaggerated. Stimulation of the left horizontal canal revealed increased vertigo and past pointing. The eyes remained turned to the left.

A Barany diagnosis was made of a supratentorial tumor in the left hemisphere.

The patient was operated on March 15, 1920, and a tumor measuring 5 by 4 by 3 cm. was partially removed from the surface of the left temporoparietal lobe, posterior to the fissure of Rolando. The tumor was not encapsulated and it was impossible to remove it entirely. The pathologist reported a glioma. (Fig. 7).

DISCUSSION.

The nine cases of proved tumors above the tentorium, all of which were primarily and independently diagnosed by the Barany test, present many interesting features.

In general there are two large groups of phenomenon syndromes that are typical of supratentorial tumors. The first group shows a very clear and marked response of nystagmus, vertigo, falling and past pointing. If the lesion is near the surface in one cerebral hemisphere, this reaction will be on the side of the lesion. Such unilateral activity of all responses cannot present any difficulty in the localization of the lesion. Symptoms of the second large group, while not so common, are just as typical of cerebral tumor as those of the first group, in which there is very clearly an active response of the nystagmus from one set of canals only, associated with an interference with the tracts in the stem or peduncles, and giving rise to diminished responses or to absence of the responses ordinarily attributed to these areas. In other words, the predominating feature, aside from an early and exaggerated nystagmus, may be the responses due to pressure.

It has been known for some time that the pressure of these tumors frequently presents the only signs and symptoms of an intracranial lesion. Choked disc and enlargement or obliteration of the sella are two notable examples which have little to do with the location of a brain lesion, but which are due to the increased intracranial pressure. So, too, the Barany test may show an apparent predominance of responses ordinarily attributed to the stem or peduncles, but which, with an exaggerated nystagmus, are due to pressure. Furthermore, these pressure responses may be on the same side or on the opposite side of the lesion. With an exaggerated and early response of nystagmus, a Barany test may reveal only those responses ordinarily attributed to a fault in the cerebellum, yet this latter response is entirely due to the pressure effects on the tracts leading to the hindbrain. This effect of pressure may be so marked that a pointing fault may be obtained for both arms from all the canals on one side, but, as a rule, by prolonged stimulation it is possible in these cases to get a stimulation through and thus obtain normal past pointing from one or both arms.

It is noteworthy that the Barany test is frequently the only test or group of tests which localizes an intracranial lesion. While this is perfectly true, it is a colossal error for any one doing such tests to be independent of all other factors in the case. It is frequently of the highest value to consult with the neurologist after the Barany diagnosis has been made.

There is another interesting observation, noted in my experience of more than fifty Barany tests, indicating supratentorial lesions, which may explain the absence or predominance of phenomenon syndromes attributed to pressure associated with cerebral lesions in different areas. In lesions on or near the surface of the cerebrum the Barany usually shows all responses exaggerated, with little or no pressure phenomena. On the other hand, lesions deep in the cortex usually show but slightly exaggerated responses, associated with marked reduction of other responses due to pressure. This observation, while very striking, is not conclusive. Many Barany tests can be explained more easily by this theory than by any other. Some of the cases presented here exemplify this observation.

In order to make clear the relative position of the Barany in the tumors localized in the cerebrum, it will only be necessary to state that the diagnosis of the location of an intracranial lesion by this test is considered as only one of a chain of evidences when the final diagnosis is determined by the neurologist. Hence, the final location of such a tumor is made by the neurologist, who considers all symptoms and signs, including the Barany test. The operative and necropsy findings should also be studied in checking up on Barany responses which apparently do not fit or which at least make the exact localization of a lesion difficult.

CONCLUSIONS

Conclusions drawn from nine proved cases of supratentorial tumors are not, of course, sufficient to account for the relation of the Barany test to lesions above the stem. However, conclusions as follows may be made:

1. A phenomenon syndrome, consisting of exaggerated nystagmus, vertigo, falling and past pointing, suggests a Barany diagnosis of a supratentorial lesion.
2. The more typical reactions may be complicated by responses due to pressure.
3. Variation in the responses may depend on the location of the lesion within the cerebrum.
4. A study of the operative and necropsy findings will be of material aid in correctly interpreting subsequent responses due to a supratentorial tumor.

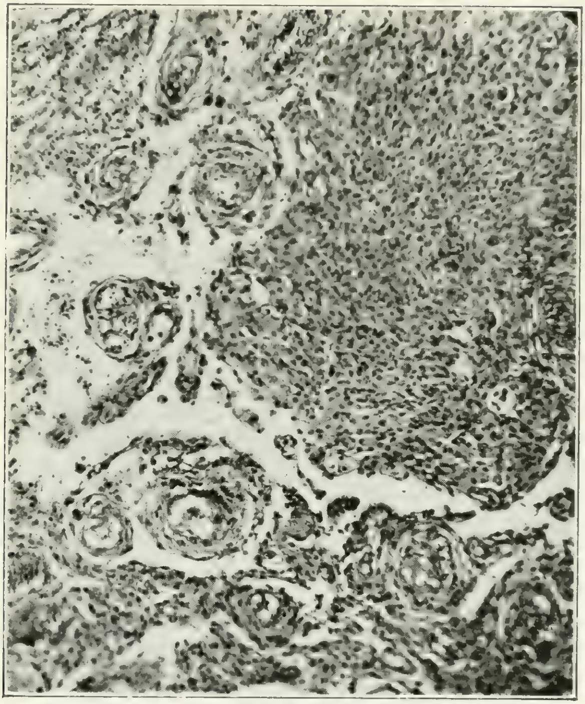

Fig. 1. (Case 236828.) Photomicrograph of glioma from the right frontomotor area of the brain. x 100.

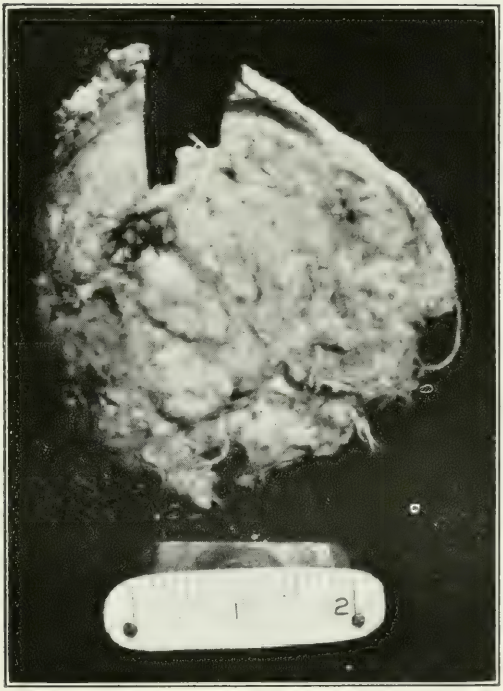

Fig. 2. (Case A293010.) Endothelioma of brain adherent to dura.

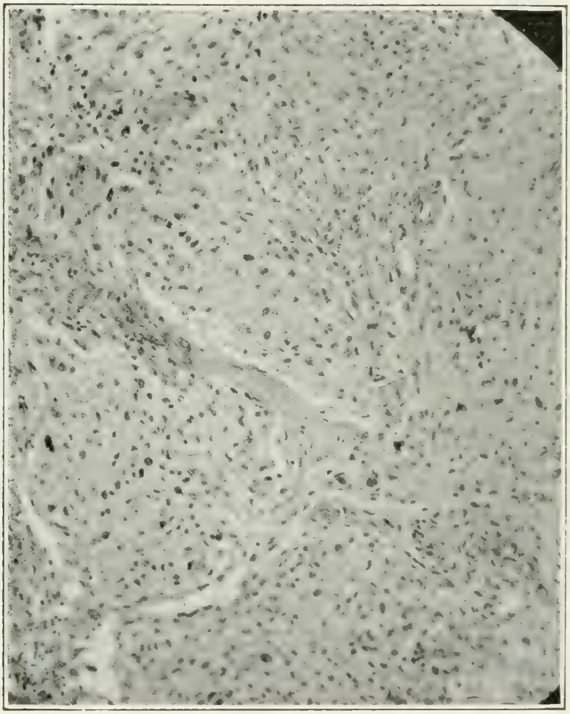

Fig. 3. (Case A293010.) Photomicrograph of section of gross specimen of endothelioma of brain shown in Figure 2. x 100.

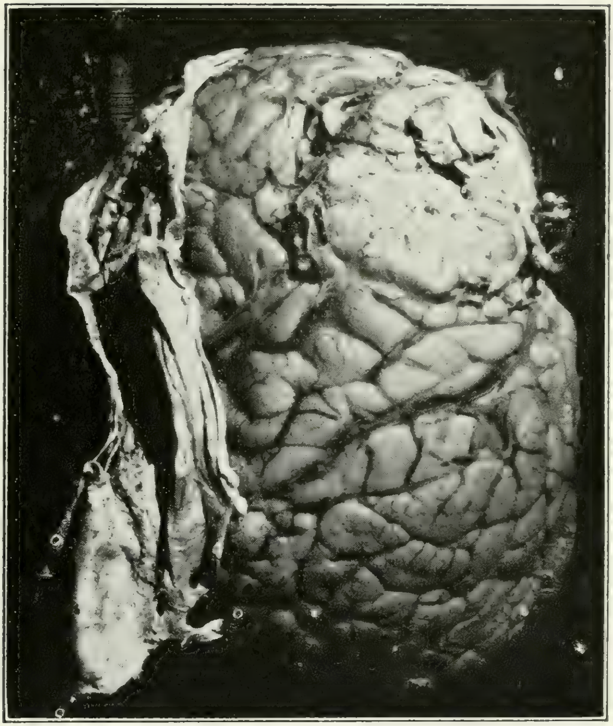

Fig. 4. (Case A224782.) Brain showing glioma of the right frontal lobe.

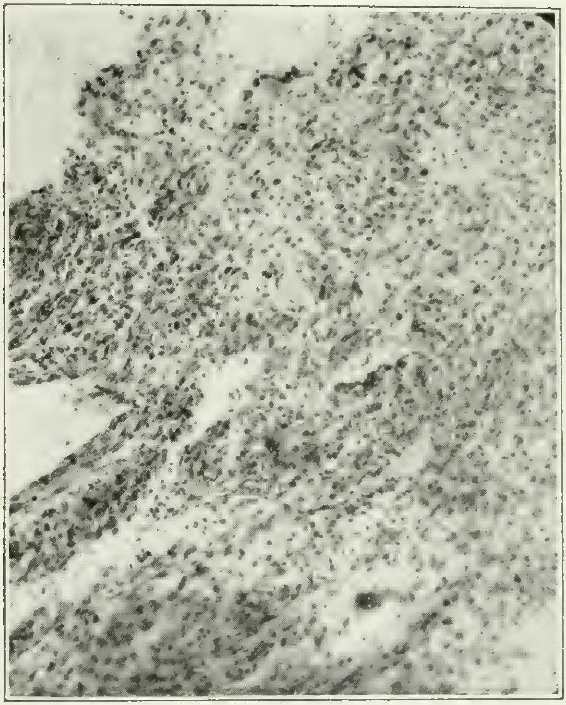

Fig. 5. (Case A224782.) Photomicrograph of glioma of right frontal lobe of brain shown in Figure 4.

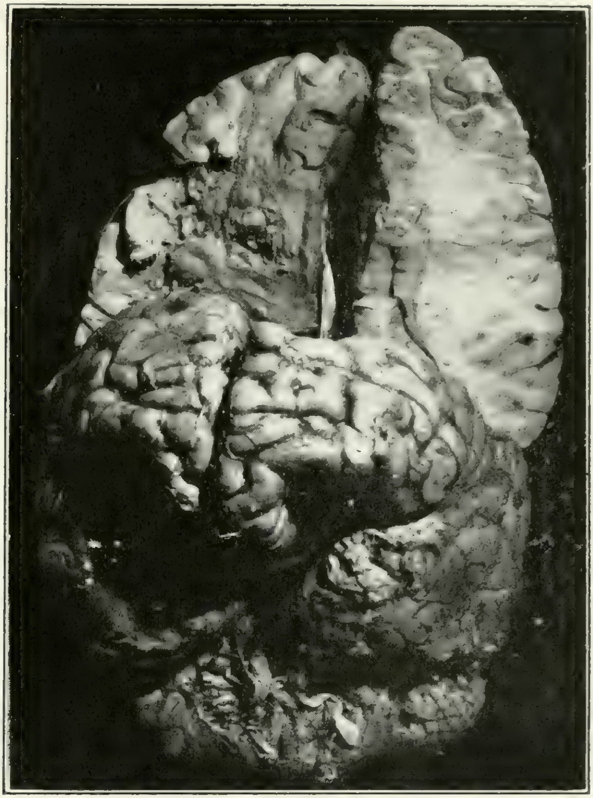

Fig. 6. (Case A248887.) Brain showing area from which smooth walled cyst was removed at operation.

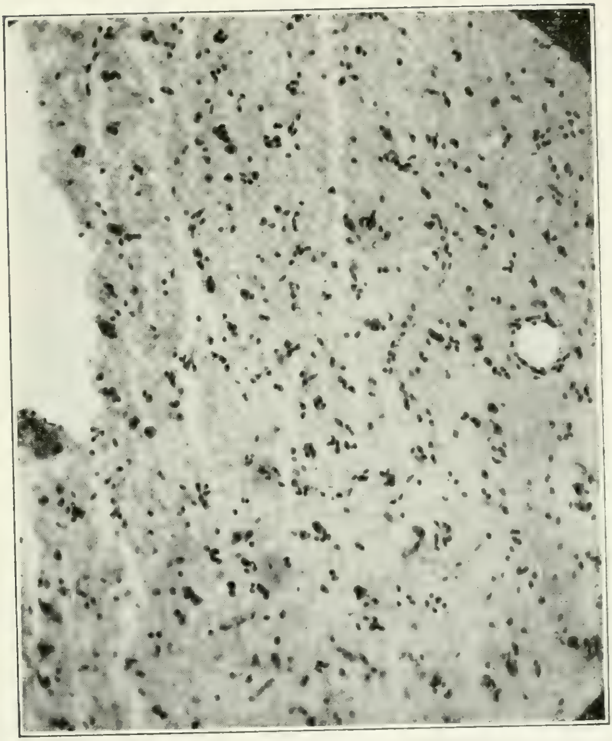

Fig. 7. (Case 308888.) Photomicrograph of glioma removed at operation from left temperoparietal lobe of the brain.

CHART 1. EQUILIBRATORY TESTS

R	HEARING	L
1 wv	Noise	1 wv
=	Weber	=
—	Rinne	—
N	Schwabach	N
-14	C	-10
- 6	C4	- 6
0	Tinnitus	0
0	Fistula	0
0	7th	0

NYSTAGMUS	SPONTANEOUS	POINTING	
	Shoulder from above	With right	With left
Looking to right ←		2 in. to Lt.	2 in. to Rt.
Looking to left →	Nystagmus	1 in. to Lt.	T* to
Looking up 0	Vertigo	T	
Looking down 0	Past pointing		
	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	TURNING		
Amp. 1 time 24 sec.	Nystag.	to	to
	Vertigo 26 seconds without vomiting	to	to
→	Pointing		
	Falling		
TO LEFT			
Amp. 1 time 22 sec.	Nystag.	to	to
	Vertigo 22 seconds without vomiting	to	to
←	Pointing		
	Falling		
RIGHT	CALORIC 68° F.		
Amp. 2 time 25 sec.	Nystag. Rapid onset	4 in. to Rt.	3 in. to Rt.
	Vertigo Marked	to	to
↷	Pointing		
HEAD BACK	Falling To the right marked onset		
Amp. 3		4 in. to Rt.	4 in. to Rt.
→			
LEFT			
Amp. 2 time 25 sec.	Nystag. Early perverted type	25 in. to Lt.	2 in. to Rt.
	Vertigo Marked with vomiting	T to	2 in. to Lt.
←	Pointing Fault with left arm		T
HEAD BACK	Falling To left; pointing fault to left		
Amp. 3		4 in. to Lt.	T to
←	*Touch.		

Case 236828

CHART 2. EQUILIBRATORY TESTS

R	HEARING	L
wv	Noise	wv
=	Weber	=
+	Rinne	+
N	Schwabach	N
N	C	N
N	C4	N
0	Tinnitus	0
0	Fistula	0
0	7th	0

Patient was very sick and the turning test was not attempted.

NYSTAGMUS	SPONTANEOUS	POINTING	
	Shoulder from above	With right	With left
Looking to right 0	the the No cooperation on/part of/patient	to	to
Looking to left 0	Nystagmus	to	to
Looking up 0	Vertigo		
Looking down 0	Past pointing		
	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	TURNING		
Amp. time	Nystag.	to	to
	Vertigo	to	to
	Pointing		
	Falling		
TO LEFT			
Amp. time	Nystag.	to	to
	Vertigo	to	to
	Pointing		
	Falling		
RIGHT	CALORIC 68° F.		
Amp. 2 time 1 sec. 30	Nystag. Perverted	to	to
	Vertigo Marked	to	to
→	Pointing. Could not be tested.		
HEAD BACK	Falling To left		
Amp. 2		to	to
→			
LEFT			
Amp. time 4 sec.	Nystag. None from verticals	to	to
	Vertigo None	to	to
None	Pointing Could not be tested		
HEAD BACK	Falling To right		
Amp. 2		to	to
←			

Case 235175

CHART 3. EQUILIBRATORY TESTS

R	HEARING	L
wv	Noise	wv
N	Weber	N
N	Rinne	N
N	Schwabach	N
N	C	N
N	C4	N
+	Tinnitus	+
0	Fistula	0
0	7th	0

NYSTAGMUS	SPONTANEOUS	POINTING	
	Shoulder from above	With right	With left
Looking to right ←		T to	T to
Looking to left →	Nystagmus	to	to
Looking up ↑	Vertigo		
Looking down 0	Past pointing		
	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	**TURNING**		
Amp time	Nystag	to	to
	Vertigo	to	to
	Pointing		
	Falling		
TO LEFT			
Amp time	Nystag	to	to
	Vertigo	to	to
	Pointing		
	Falling		
RIGHT	**CALORIC 68° F.**		
Amp 1 time 2 sec 40	Nystag Delayed	T to	1in. to Rt.
	Vertigo Present with set nausea	1in. to Rt.	1in. to Rt.
↷	Pointing Reduced reaction		
HEAD BACK	Falling Not present		
Amp 2	Pointing increased	16in. to Rt.	10in. to Rt.
→			
LEFT			
Amp 2 time sec 22	Nystag Very active onset	14in. to Lt.	16in. to Lt.
	Vertigo Marked with vomiting	to	to
↶	Pointing Greatly increased		
HEAD BACK	Falling Marked to the left		
Amp 2	Very active reactions	14in. to Lt.	14in. to Lt.
←			

Case 293010

CHART 4. EQUILIBRATORY TESTS

R	HEARING	L
....	Noise	....
....	Weber	....
N	Rinne	N
N	Schwabach	N
N	C	N
....	C4	....
+	Tinnitus	+
....	Fistula	....
....	7th	....

NYSTAGMUS	SPONTANEOUS	POINTING	
	Shoulder from above	With right	With left
Looking to right 0		1in. to Rt.	T to
	Nystagmus	to	to
Looking to left 0	Vertigo		
Looking up ↑	Past pointing		
Looking down ↓	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	**TURNING**		
Amp 1 time 25 sec.	Nystag	to	to
	Vertigo Marked	to	to
→	Pointing		
	Falling		
TO LEFT			
Amp 1 time 22 sec.	Nystag	to	to
←	Vertigo Marked	to	to
	Pointing		
	Falling		
RIGHT	**CALORIC 68° F.**		
Amp 1 time 50 sec.	Nystag Perverted for vertical	T to	2in. to Rt.
↗ ↑	Vertigo Marked	to	to
HEAD BACK	Pointing Fault for right arm		
	Falling Normal		
Amp 2	Point fault for right arm	T to	2in. to Rt.
→			
LEFT			
Amp 1 time 50 sec.	Nystag Perverted	T to	4in. to Lt.
↑ ↖	Vertigo Marked	to	to
HEAD BACK	Pointing Fault with right arm		
	Falling Normal		
Amp 2	Pointing fault with right arm	T to	4in. to Lt.
←			

Case 241430

CHART 5. EQUILIBRATORY TESTS

R	HEARING	L
wv	Noise	wv
=	Weber	=
....	Rinne	....
N	Schwabach	N
N	C	N
N	C4	N
0	Tinnitus	0
0	Fistula	0
N	7th	N

NYSTAGMUS	SPONTANEOUS	POINTING	
	Shoulder from above	With right	With left
Looking to right 0		T to	T to
Looking to left 0	Nystagmus	to	to
Looking up 0	Vertigo		
Looking down 0	Past pointing		
	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	TURNING		
Amp 2 time 26 sec.	Nystag. Marked and pure	to	to
	Vertigo. Marked nausea and retching	to	to
→	Pointing Normal		
	Falling. Slight to right		
TO LEFT			
Amp 2 time 26 sec.	Nystag. Marked and pure	to	to
	Vertigo. Marked nausea and retching	to	to
←	Pointing Normal		
	Falling. Slight to left		
RIGHT	CALORIC 68° F.		
Amp 2 time 30 sec.	Nystag. Marked	12 in. to Rt.	10 in. to Lt.
↷	Vertigo. Increased from normal	to	to
HEAD BACK	Pointing Exaggerated		
	Falling. Very marked		
Amp	Responses increased	8 in. to Rt.	6 in. to Lt.
→			
LEFT			
Amp 2 time 40 sec.	Nystag. Moderate amplitude	8 in. to Lt.	6 in. to Lt.
	Vertigo. Increased	to	to
↶	Pointing Exaggerated		
HEAD BACK	Falling. Present		
Amp	Response exaggerated	6 in. to Lt.	6 in. to Lt.
←			

Case 221019

CHART 6. EQUILIBRATORY TESTS

R	HEARING	L
wv	Noise	wv
=	Weber	=
+	Rinne	+
-2	Schwabach	-2
N	C	N
-6	C4	-6
0	Tinnitus	0
0	Fistula	0
0	7th	0

NYSTAGMUS	SPONTANEOUS	POINTING	
	Shoulder from above	With right	With left
Looking to right ←		T to	T to
Looking to left →	Nystagmus	to	to
Looking up 0	Vertigo		
Looking down 0	Past pointing		
	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	**TURNING**		
Amp. time	Nystag.	to	to
	Vertigo	to	to
	Pointing		
	Falling		
TO LEFT			
Amp. time	Nystag.	to	to
	Vertigo	to	to
	Pointing		
	Falling		
RIGHT	**CALORIC 68° F.**		
Amp. 1 time 40 sec.	Nystag. Prompt onset	? to	– to
	Vertigo. Set exaggerated only	to	to
↷	Pointing. Questionable		
HEAD BACK	Falling. Not induced		
Amp. 2	Questionable pointing fault	? to	– to
→			
LEFT			
Amp. 2 time 40 sec.	Nystag. Prompt onset	6 in. to Lt.	8in. to Lt.
	Vertigo. Marked with nausea	to	to
↶	Pointing. O.K.		
HEAD BACK	Falling. To left		
Amp. 2	Normal	6 in. to Lt.	4in. to Lt.
←	Tendency for her to hold eyes to left.		

Case 246431

CHART 7. EQUILIBRATORY TESTS

R	HEARING	L
....	Noise	....
....	Weber	....
....	Rinne	....
N	Schwabach	N
N	C	N
N	C4	N
....	Tinnitus	....
....	Fistula	....
....	7th	....

First Barany.

NYSTAGMUS	SPONTANEOUS	POINTING	
	Shoulder from above	With right	With left
Looking to right 0		T to	T to
Looking to left 0	Nystagmus	to	to
Looking up 0	Vertigo		
Looking down 0	Past pointing		
	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	**TURNING**		
Amp 1 time 15 sec.	Nystag Rapid onset	to	to
→	Vertigo Absent	to	to
	Pointing		
	Falling		
TO LEFT			
Amp 1 time 16 sec.	Nystag Rapid onset	to	to
←	Vertigo Absent	to	to
	Pointing		
	Falling		
RIGHT	**CALORIC 68° F.**		
Amp 1 time 1 sec.	Nystag Normal	3 in to Rt.	2 in to Rt.
↷	Vertigo None	to	to
HEAD BACK	Pointing Normal		
Amp 1	Falling Not present		
→	Normal	2 in to Rt.	2 in to Rt.
LEFT			
Amp time 4 sec.	Nystag None in 4 minutes	T to	T to
Only jerks	Vertigo Absent	to	to
HEAD BACK	Pointing Fault with both arms		
Amp	Falling Not present		
←	Normal	4 in to Lt.	3 in to Lt.

Case 224782

CHART 8. EQUILIBRATORY TESTS

R	HEARING	L
....	Noise	....
....	Weber	....
...	Rinne	....
N	Schwabach	N
N	C	N
N	C4	N
....	Tinnitus	....
....	Fistula	....
....	7th	....

Second Barany.

NYSTAGMUS	SPONTANEOUS	POINTING With right	POINTING With left
	Shoulder from above	2 in. to Lt.	T to
Looking to right ←	Nystagmus	to	to
Looking to left →	Vertigo		
Looking up ↑	Past pointing		
Looking down 0	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	**TURNING**		
Amp. 2 time 30 sec.	Nystag. Right rotary and horizontal also vertical		to
↷ → ↑	Vertigo None	to	to
	Pointing		
Conjugate deviation	Falling To right		
TO LEFT			
Amp. time 25 sec.	Nystag. Perverted	to	to
↶ ←	Vertigo	to	to
	Pointing		
	Falling To right		
RIGHT	**CALORIC 68° F.**		
Amp. 2 time 50 sec.	Nystag. Perverted	T to	T to
↑ ↷	Vertigo None	to	to
HEAD BACK	Pointing Faults with both arms		
	Falling None		
Amp		T to	T to
↷ Tendency to conjugate deviation			
LEFT			
Amp. 2 time sec.	Nystag. Perverted	2in. to Lt.	1 in. to Lt.
↑ → ↷	Vertigo None	to	to
HEAD BACK	Pointing Reduced		
	Falling None		
Amp		T to	T to
None	Pointing faults with both arms		

Case 224782

CHART 9. EQUILIBRATORY TESTS

R	HEARING	L
wv	Noise	wv
=	Weber	=
+	Rinne	+
-5	Schwabach	-5
N	C	N
N	C4	N
+	Tinnitus	+
0	Fistula	0
0	7th	-

NYSTAGMUS	SPONTANEOUS	POINTING	
	Shoulder from above	With right	With left
Looking to right 0		T to	to
Looking to left 0	Nystagmus	to	to
Looking up 0	Vertigo		Paralysis
Looking down 0	Past pointing		
	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	TURNING		
Amp 2 time 16 sec.	Nystag	to	to
	Vertigo 17 sec.	to	to
	Pointing		
→	Falling		
TO LEFT			
Amp 2 time 17 sec.	Nystag	to	to
	Vertigo 17 sec.	to	to
	Pointing		
←	Falling		
RIGHT	CALORIC 68° F.		
Amp 0 time 3 sec.	Nystag Absent	4 in. to Rt.	Paralysis to
	Vertigo Present	to	to
0	Pointing O.K. with right		
HEAD BACK	Falling Not present		
Amp 1		4 in. to Rt.	to
→			
LEFT			
Amp 1 time 1 sec 00	Nystag Hyperactive	6 in. to Lt.	Paralysis to
	Vertigo Marked with vomiting	to	to
↶	Pointing O.K. with right		
HEAD BACK	Falling To left		
Amp 2	Hyperactive	8 in. to Lt.	to
←			

Case 248887

CHART 10. EQUILIBRATORY TESTS

R	HEARING	L
wv	Noise	wv
N	Weber	N
N	Rinne	N
....	Schwabach	....
N	C	N
0	C4	0
0	Tinnitus	0
0	Fistula	0
....	7th	....

Unable to turn eyes upwards or to right.

NYSTAGMUS	SPONTANEOUS	POINTING With right	POINTING With left
	Shoulder from above		
Looking to right 0		2 in. to	to Lt.
Looking to left 0	Nystagmus	to	to
Looking up 0	Vertigo		
Looking down 0	Past pointing	Paralysis	
	Falling		
	Romberg		
	Head to right		
	Head to left		
	Overthrow		
TO RIGHT	TURNING		
Amp 1 time 35 sec.	Nystag. Wide amplitude	to	to
	Vertigo Present	to	to
→	Pointing		
	Falling		
TO LEFT			
Amp 1 time 35 sec.	Nystag. Wide amplitude	Paralysis to	to
	Vertigo Present	to	to
←	Pointing		
	Falling		
RIGHT	CALORIC 68° F.		
Amp 2 time 45 sec.	Nystag. Wide amplitude prompt onset	Paralysis to	5 in. to Rt.
↷	Vertigo Increased over normal	to	to
→	Pointing Absent with right		
HEAD BACK	Falling Not induced		
Amp 2	Eyes turned to left throughout	to	10in. to Rt.
→			
LEFT			
Amp 2 time 43 sec.	Nystag. Prompt onset	Paralysis to	6in. to Lt.
	Vertigo Increased over normal	to	to
↶	Pointing Absent with right		
HEAD BACK	Falling No induced		
Amp 2	Eyes turned to left throughout	to	8in. to Lt.
←			

Case 308888

LXXXI.

PRIMARY PERIOSTITIS OF THE MASTOID.*

By Samuel Salinger, M. D.,

Chicago.

Inflammation of the periosteal covering of the mastoid occurring independently of any infection of the tympanic cavity or mastoid cells is a condition not infrequently encountered and one that merits careful consideration.

The earliest recognition of this condition is to be found in a report of three cases by Voltolini,[1] who regarded them as idiopathic localized phlegmons probably due to exposure to cold, and who postulated the following conclusions: "The disease," says he, "is neither of the auricle, the external auditory canal, the tympanic cavity nor the mastoid; it originates from without and not within the ear; it may progress inward but not very deeply." Politzer[2] states that "the disease may involve only a circumscribed area or may take in the entire mastoid cortex," and that "it is characterized by the formation of a hard, usually red, swelling on the mastoid which slopes down at the border, is accompanied by fever and great pain, and is very tender to the touch."

The etiology in many instances is obscure, and while most authors mention trauma or exposure as the principal exciting causes, a variety of other factors have been reported. These are the estrus larvæ,[1] vicarious menstruation,[3] typhoid fever,[4] tuberculosis,[5] syphilis,[6] actinomycosis,[7] breaking down of the small superficial postauricular lymph gland,[8] erpsipelas[9] and osteomyelitis.[10] Others[11] [12] [13] [14] claim that the infection finds its atrium in the meatus at the cartilagoosseous junction of the posterior wall. Jacques and Gault[7] (also Wurdman[9]) cite several cases which ensued some time after a healed suppurative otitis media, and while not claiming that these are, strictly speaking, primary periostitis, they, nevertheless, are to be distinguished from the cases which accompany infection of the mastoid cells. They state the proposition thus: "Cases may properly be termed primary when they relate to a local trauma or a systemic infection. When, however, they develop after a recently healed otitis media they are more truly an osteomyelitis that is neither primary nor hematogenous but simply isolated. That is, they develop independently with relation to an otitic cause and are capable of independent treatment." Laurens[15] reports a case where following an acute otitis media a collection of pus was found on the mastoid process, though at operation the antrum and mastoid cells proved to be entirely free from disease. He firmly believes that the infection was carried by the blood stream directly to the cortical periosteum. Cases of the latter type, according to our point of view, should be excluded and none considered as truly primary unless their connection with a tympanic or mastoid infection be definitely ruled out.

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*Read before the Chicago Laryngological and Otological Society, March 1, 1920.

The disease in many respects resembles the secondary periostitis or mastoid edema which so frequently accompanies an acute mastoiditis or the early stages of a severe suppurative otitis media. The typical case begins rather abruptly with pain referred to the ear or to the region behind the auricle, which may radiate into the neck or toward the occiput, a moderate rise in temperature and the rapid formation of a hard red swelling over the mastoid, which is usually extremely painful to the touch. Occasionally, according to Politzer, "the inflammation may develop slowly and be practically painless." Such cases, says he, "are likely to lead to superficial necrosis of the cortical layer of the mastoid process with exfoliation of small fragments of bone."

The hearing is frequently diminished, owing to a consecutive middle ear catarrh, and when this condition obtains it adds greatly to the difficulty in diagnosis, particularly if the postauricular swelling develops slowly.

In some cases the posterior meatal wall is involved, thus obscuring a view of the tympanic membrane and presenting a picture closely resembling a true mastoiditis.[16] Not all of the cases go on to suppuration,[17 18 19 13 24] resolution in some instances taking place within a few days. In the majority, however, after a period of from three to ten days, fluctuation can be elicited directly behind or above and behind the auricle.

Occasionally the abscess will rupture spontaneously into the auditory canal at the cartilago-osseous junction or through one of the fissures of Santorini. Also it has been known to rupture into the infraauricular space and to follow the sternomastoid muscle into the neck.

The diagnosis as a rule is easy, if the tympanic membrane can be seen and is found to be normal. However, in those cases where the posterior wall of the osseous meatus is found to be swollen and that portion of the tympanic membrane which is visible is seen to be injected, one might not be able to determine with certainty whether a middle ear or mastoid infection is present and responsible for the symptoms. Particularly so, if one happens to be on the lookout for a streptococcus mucosus infection, which is prone to touch the middle ear but lightly and wreak its havoc almost entirely in the mastoid. In this connection it should be borne in mind, as pointed out by Ostman[20] and by Webster,[25] that swelling of the osseous meatus due to mastoid involvement rarely occurs earlier than the second or third week following the onset of an acute suppurative otitis media, whereas if due to a primary periostitis this swelling develops rapidly and may be found at the very onset of the symptoms concurrent with the swelling behind the auricle. A deep seated furuncle of the auditory canal might be mistaken for a true primary periostitis if accompanied by early postauricular swelling. In these cases, however, the pain and meatal swelling always precede the appearance of the external swelling.

These facts were well illustrated in a case which was under my care a year ago. A gentleman about 40 years of age applied for the relief of nasal obstruction due to a markedly deviated septum and a purulent discharge which originated in the sphenoid and posterior ethmoids on the deviated side. A few days before the date set for operation he complained of pain in the ear, on the same side as the nasal pathology. The examination disclosed a swelling above and anterior to the auricle which was quite tender to the touch. The auditory canal contained a small amount of epithelial debris and was partially blocked by a swelling of the superior and posterior osseous walls which obscured a view of the drumhead. Under palliative treatment the symptoms subsided within three days and the membrane was then seen to be pale, lusterless, somewhat retracted and not inflamed. The membrane on the opposed side had practically the same appearance. The nasal operations were performed and were healing satisfactorily when on the fourth day the swelling above and anterior to the auricle reappeared, accompanied by pain, tenderness, a slight rise in temperature and a swelling of the posterior and superior walls of the osseous meatus. As the symptoms were increasing in severity, we concluded that the affair was primarily of the auditory canal, the drum membrane not being visible, and, therefore, under local anesthesia, made an incision deeply into the swollen meatal wall, but without encountering any pus. The condition, however, improved immediately, the swelling, both internal and external, subsiding rapidly, and the drum membrane being again visible showed nothing more than a slight injection of its epidermal layer. Two days later the symptoms reappeared with increased severity. The external edema extended from in front of the auricle to the temporal region and behind almost to the tip of the mastoid and was much more tender than before. The osseous meatus was also swollen until the canal was almost occluded. Within four days the swelling localized directly behind and above the auricle, lifting it away from the skull, and showing distinct flucation. An incision was then made under local anesthesia behind and close to the auricle, and a large quantity of pus evacuated. The bone was found denuded of its periosteum, but careful search failed to reveal any fistula either into the bone or into the auditory canal. The wound was closed with drainage. The swelling disappeared within a few days and the wound healed completely within ten days.

Cases very similar to the above have been reported by Meniere[11] and doubtless have also been noted by many of the members of the society. The location of the swelling above and anterior to the auricle is not unusual. Gellé[21] has noted types in which the swelling extended as far forward as the external margin of the orbit, as far backward as the occiput and as far downward as the clavicle.

The unusual feature of the case cited was its delayed development after two abortive beginnings.

Another case of the slowly developing type referred to by Politzer and one in which the etiology was obscure occurred in a little girl of four who had been under the care of a dermatologist for pemphigus and who was referred to me because of pain in the ear. There was no history of either trauma or exposure. The examination disclosed a tender swelling behind and above the auricle. The auditory canal was uninvolved and the tympanic membrane appeared duller and more opaque than in the opposite ear. Although it did not appear to be an acute otitis media, the membrane was nevertheless incised because of a possible connection with the external edema. Nothing, however, was obtained but a little thin mucoid secretion. The case was treated by palliative measures while the postauricular swelling developed in size and tenderness. During this period of five days there was only slight spontaneous pain and the temperature never rose above 100° F. There was scarcely any discharge from the ear following the paracentesis, which promptly closed, leaving the drum membrane as originally found. At the end of the fifth day the auricle was pushed forward and downward by the swelling, which was now extremely tender and slightly fluctuating. An incision was made and a large subperiosteal abscess evacuated. The squamomastoid suture was not patent and no fistula could be discovered. However, just above the posterior root of the zygoma, the bone was found to be eroded over an area about the size of a dime. This was thoroughly curetted, and as no fistula or aberrant cells could be discovered, the wound was then closed with drainage. Within two weeks it was entirely healed.

The X-ray findings prior to operation in both of these cases were not of great assistance in the diagnosis, as the denser shadow on the affected side could equally as well have been produced by pus within the mastoid as on its surface.

In conclusion, the points that should be emphasized in connection with the diagnosis are, first, the absence of any recent middle ear infection; second, the preponderance of the local over the constitutional symptoms, and third, the slow development of suppuration. Because of the last named factors it has been advised by most authors[2, 13, 9, 3] that the swelling be incised early, as the pain is thereby alleviated, and frequently the condition clears up without the formation of pus. To temporize, as was done in the cases here reported, is to invite unnecessary destruction of tissue, in the one case leading to superficial necrosis of the bone, and in cases reported by Burnett,[23] Hotz,[14] Voltolini[1] and others, the pus burrowing its way into the auditory canal or into the tissues of the neck producing troublesome fistulæ.

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25 E. WASHINGTON ST.

Abstracts From Current Literature

I.—EAR.

Temporozygomatic Paramastoiditis.

Mouret and Seigneurin.

Rev. de laryngol., etc., Paris, 1920—XLI—65.

In a long and valuable article, Mouret sets forth the necessity of performing a complete operation in every case of mastoiditis. Only in this way can hidden and unsuspected areas of disease lying behind healthy bone be discovered. Illustrative of this he reports in summary nine cases where bone lesions were discovered adjacent to the mastoid, which if left uncared for, would have delayed or rendered healing impossible. These adjacent localities he describes as the paramastoid and gives to an inflammation of the cells involved the term "Temporozygomatic Paramastoiditis."

In the majority of cases, the infection from the middle ear and the antrum is propagated to the squamosa and the squamozygomatic lamella, resulting either in superficial or deep edematous reactions or in the formation of deep or superficial temporal abscesses. The infection is carried to the paramastoid by continuity through the Haversian canals or by the lymphatics or blood vessels. This diffusion is particularly favored when the squamozygomatic lamella contains many cells. Analogous to the cribriform area behind the meatus two cribriform zones are found in this region, the suprameatic zone and the deep temporal zone. Their development varies in different individuals. They both enter largely into the transmission of the infection. Frequently, a fistula can be demonstrated; at other times there is a superficial necrotic erosion. In brief, the infection from the tympanum and antrum invades the bone canals or the bone cells from their attacking the internal cortex by necrosis or the external cortex by necrosis, but also by means of the cribriform, suprameatic and deep temporal cribriform zones. As a result of the presence of a bony lamella which separates the internal and external cortex, the infection may advance to the meninges and brain or externally. If it extends externally there can be either a simple osteitis with edema of the temporal muscle or an ostitis with necrosis and a collection of pus in the deep temporal fossa with more or less lardaceous edema of the temporal muscle, even leading to a necrosis in the bone with the formation of a fistula. The symptoms are slight. The chief symptom is trismis when the muscle is involved, and a painful tumefaction and temporopalpebral edema when the involvement is superficial. Systematic exploration of the paramastoid regions is always indicated in the presence of symptoms of disease. There a careful exploration is doubly called for. This includes a prolongation of the usual retroauricular incision and then the examination of the entire area according to a carefully described plan of procedure.

Harris.

Paralysis of the External Motor Oculi Nerve in the Course of an Attack of Acute Suppurative Otitis Media on the Opposite Side.

De Lamothe.

Rev. de laryngol., etc., Paris, 1920—XLI—198.

The author has recently seen such a case in a child of nine, suffering from acute mastoiditis on the right side requiring operation. Following the operation, meningeal symptoms developed, although the lumbar puncture was normal. Ten days after the operation the child suddenly complained of seeing double. Examination showed a paralysis of the sixth nerve on the left side. The child eventually made a complete recovery.

Various cases of this kind in the literature have been examined with a view to the explanation of the cause. Three theories are advanced: the reflex, anatomic and the serous meningitis. The author regards the theory of the reflex origin as untenable, and as the result of a careful study of a number of skulls, dismisses the possibility of anatomic cause. In his judgment, the only possible explanation is that of a serous meningitis. He frankly admits that his theory in itself does not explain why the paralysis should be produced on the other side. In the great majority of cases he admits that the paralysis follows on the side of the diseased ear; on the other hand, it must not be forgotten that if the cause of the hypertension of the cerebrospinal fluid is well localized, the pressure will be exerted not there alone but upon all the cranial nerves. Under these conditions the most fragile nerve will suffer first. Such being the case, there is nothing to exclude the possibility of the motor oculi nerve on the opposite side being more delicate than the nerve on the side of the ear lesion. So far as treatment is concerned, the two indications are, the drainage of the ear, and secondly the combating of the hypertension of the cerebrospinal fluid. Harris.

An Unusual Case of Lateral Sinus Thrombosis.

Friedman, Joseph, and Greenfield, Samuel D.

Med. Rec., New York, 1920—LXCVIII—943.

This case presents four special features:

1. The infection through the sclerotic mastoid to the sinus took place with unusually great rapidity. The ear symptoms from the date of onset to the operation were only of ten days' duration.

2. The more pronounced symptoms indicating such a severe involvement were entirely lacking. Nothing that could be detected at the time of examination pointed to the possibility of such a serious complication. It should be remembered that this was an ambulatory case of sinus thrombosis.

3. The actual demonstration of pus in the sinus.

4. The absence of bleeding from the jugular bulb after removing all clots from the sigmoid below the knee to the bulb, showed conclusively that the thrombosis must also have extended at least into the inferior petrosal sinus. Nevertheless, nothing developed as a consequence. Emil Mayer.

Report on Twenty-seven Cases of Jugodigastric Mastoiditis.

Mouret.

Rev. de laryngol., etc., Paris, 1920—XLI—167.

Lesions of the digastric triangle are most difficult to attack. They are the result of infection of the deep subantral zone, and in order to attack them the superficial subantral zone must be entirely removed. They lie deeply seated on the base of the skull. Total removal of the apex is necessary. Approach must be made through the base of the neck, and the posterior belly of the digastric muscle must be detached from its insertion in the digastric triangle which is the seat of the bony lecions in jugodigastric mastoiditis. Access to this deep region is more difficult than to that on the outside of the muscle; more difficult than that on the inside of the apex. The operator too often stops his work on the internal surface of the apex. If he wishes to discover the jugodigastric regions, he must go further. Mouret distinguishes two parts to this triangle, one posteriorly, the region of the bulb, and the anterior, the floor of the deep subantral zone of the mastoid. It is particularly in the anterior part that the disease is apt to be met. In the twenty-seven cases which he has seen he notes eleven fistulas at the summit of the digastric triangle. His explanation of the number of cases that he has seen and the rarity that they are met with by others, is that due to his early experience he has systematically looked for them and so has found them. Harris.

II.—NOSE.

Nasal Deformities Due to the Submucous Operation, Their Prevention and Their Treatment.

Carter, William Wesley.

Med. Rec., New York, 1920—LXCVIII—810.

The course to be adopted in the treatment of the depressed deformities resulting from the submucous operation admits of no discussion. There is only one satisfactory method by which they may be corrected, and that is by the transplantation of bone or cartilage, or preferably by a combination transplant composed of both cartilage and bone. In these cases a transplant from the ninth rib, composed of two-thirds bone and one-third cartilage, is taken at the junction of the rib with the costal cartilage. The transplant is introduced from within the nose and no scar results. The full strength of the nasal bridge is restored and the repair is permanent, for some cases have been under observation long enough to demonstrate this fully. The bone transplant establishes a firm bony union with the frontal bone and supports a nasal bridge in its normal position; the cartilage preserves the normal flexibility of the nasal tip.

While the number of deformities resulting from the submucous operation are few in comparison with the number of cases operated upon, still the knowledge that these deformities are serious in their import and that they may and do occur in the hands of unskilled operators and others when proper precautions are not observed, if sufficient justification for this presentation of the subject. Emil Mayer.

Etiology of Deviations of the Nasal Septum: Anatomic Theory.

Spielberg, William.

J. Am. M. Ass., Chicago, 1920—LXXV—1646.

The nasal septum divides the bony structure into two compartments. It is surrounded by hard, unyielding, bony tissues which begin to ossify from the first to the eighth week of gestation. The septum, composed of the vomer, perpendicular plate of the ethmoid and triangular cartilage, ossifies so far as the bony portion is concerned, from the second year to puberty. Of course, the cartilage remains soft throughout life.

It is easily conceived, therefore, that the surrounding bony structures, ossifying at a much earlier period than the bony septum, will cause the septal constituents to deflect or deviate in order to permit it to occupy its proper space. It is as if one should attempt to insert a paper perpendicularly into a box of small dimensions. The paper would, of course, assume the form of an S or bend out with concavoconvex configuration. Emil Mayer.

Chronic Maxillary Sinusitis and Albuminuria.

Liebault.

Rev. de laryngol., etc., Paris, 1920—XLI—129.

The author reports four cases of chronic antrum disease (at first unrecognized) which were found to be the cause of a persistent albuminuria which cleared up as a result of treatment to the sinus. He argues, based on the study of these cases, that it must never be forgotten that chronic maxillary sinusitis may be often very atypical, showing itself by only slight nasal secretion, either mucopurulent or with some purulent crusts. In every case it is well to bear in mind, when an individual complains of lowered vitality, is pale, has dyspeptic troubles and has a little albumin in the urine, a careful examination of the sinus with an exploratory puncture will at times give the explanation of the albuminuria and permit the securing of a rapid recovery. Harris

III.—PHARYNX AND MOUTH.

Effect of Tonsillectomy on the Recurrence of Acute Rheumatic Fever and Chorea.

St. Lawrence, William.

J. Am. M. Ass., Chicago, 1920—LXXV—1040.

The writer presents the following conclusions:

1. Eighty-five children, each of whom had presented one or several of the rheumatic manifestations before the tonsils were completely removed, were observed during an average period of three and one-half years after the operation was performed.

2. The tonsils were markedly hypertrophied in 13 per cent of the cases, moderately so in 69 per cent of the cases, and not enlarged in 18 per cent of the cases. They were the site of recurrent inflammation before the tonsils were removed in 73 per cent of the cases. "Sore throat" recurred after removal of the tonsils in 7 per cent of these. At least two operations were necessary before the tonsils were completely removed in 22 per cent of the cases.

3. The tonsillar lymph nodes were enlarged in 100 per cent of the cases before the operation was performed, while in 59 per cent of the cases they were impalpable afterward.

4. One or more acute attacks of rheumatic fever had occurred in forty-two cases before the tonsils were removed. After tonsillectomy there was no recurrence in thirty-five cases, or 84 per cent.

5. One or more attacks of chorea had occurred before the removal of the tonsils in forty cases, and there was no recurrence after the operation in twenty cases, or 50 per cent.

6. Sixty-one cases showed myostitis and bone or joint pains before the operation was performed, and there was no recurrence in forty-seven cases, or 77 per cent.

7. Fifty-eight cases of organic disease of the heart were present in the series. Twelve of these patients had suffered at least one attack of cardiac failure before the tonsils were removed. One patient suffered one attack afterward.

8. The exercise of tolerance in the cases of cardiac disease seemed to be favorably influenced by tonsillectomy in the instances in which indications existed for the removal of the tonsils.

9. Nutrition and general health were improved, and intercurrent disease was less common after the tonsils were removed.

10. Tonsillectomy (complete removal of the tonsils) would seem to be the most important measure at present available for the prevention of acute rheumatic fever and the allied rheumatic manifestations.

Emil Mayer.

The Anatomy, Physiology and Pathology of the Tonsillar Structures in Relation to Cryptogenic Infections.

Wood, George B.

Med. Rec., New York, 1920—LXCVIII—595.

It is probable that in the majority of infections of the tonsil that there has been some break in the epithelium due to the necrotic action of the bacterial toxins which have developed from the organisms in the lumen of the crypt. It is possible, however, that a certain amount of toxic material is absorbed directly through normal cryptal epithelium, especially in those cases of chronic tonsillar disease in which the lumen of the crypt has been obliterated, forming within the tonsil a retention cyst of necrotic infected material.

In acute tonsillitis the tonsil is infected in the following manner. The infecting organism gains access to the crypt, producing there, by its growth, sufficient irritation to cause a distinct reaction in the epithelium. This reaction is manifest by a proliferation of the epithelial cells, as shown by the increase of desquamation and of penetration of the basal cells into the tonsil parenchyma and the presence of mitotic figures in the epithelial cells. If the infecting organism is not of sufficient virulence, this proliferation of the epithelium may prevent invasion, and we have as the result a simple parenchymatous tonsillitis. When the toxic action, however, is more severe, certain portions of the epithelium become necrotic and this process may progress until the parenchyma of the tonsil is opened to the infecting bacteria. The bacteria then passes with the current of the interfollicular tissue toward the lymphatics, or they may become arrested in the germinating follicles where through their development abscess formation takes place in the follicle which later ruptures into a neighboring crypt, producing a purulent discharge at the mouth of the crypt which is so characteristic of the suppurative tonsillitis. The organisms that reach the efferent lymph vessels are carried to the regionary lymph nodes, producing the lymph adenitis which is associated with all severe cases of tonsillitis.

In sumimng up the evidence presented, it would seem that systemic infection, because of the peculiar anatomy of the crypts, and because of the peculiar property of absorbing substances from its crypts, and of the extremely low resisting quality of the cryptal epithelium to bacterial attacks, takes place more readily through the tonsillar structures than through any other portion of the upper respiratory tract. That the tonsil itself is not destroyed by the numerous invasions to which it is subjected must be ascribed to its great power of recuperation and regeneration.

Emil Mayer.

Vincent's Angina Infection—Its. Prevalence, Manifestations, Bacteriology and Treatment—Report of Fifty-six Cases.

Reckord, Frank F. D., Assisted by Baker, M. C.
J. Am. M. Ass., Chicago, 1920—LXXV—1624.

The author desires to emphasize strongly the value of the use of arsphenamin locally in the form of a 10 per cent solution in glycerin, or, for practical purposes, 0.6 gm. of arsphenamin dissolved in two fluid drams of glycerin. It does not seem to disintegrate in this way, and if dissolved in sterile water or salt solution and neutralized with sodium hydroxid, the preparation will become useless in a short while after being prepared. The author believes also that it is better to mix all the powder with the glycerin at one time rather than to dissolve just enough for the particular application; there is no serious objection to this method. The parts to be treated should be thoroughly cleansed and dried, and then the arsphenamin solution applied by a small cotton swab and the material thoroughly rubbed into the lesions. It is surprising to see the good results by applying this treatment twice a day. The duration of the disease is shortened materially, and it seems also to lessen the pain associated, which is particularly prevalent when the gums are involved. It is also indicated in those cases in which the gums are primarily involved and there is infection about the teeth, such as pyorrhea, as the author has found that about 90 per cent of such cases show fusiform bacilli and spirochetes resembling Vincent's organism.

The next substance that gave good results was 2 per cent solution of chromic acid, applied in the same manner or sprayed on with an atomizer. Some observers have used tincture of iodin, colloidal silver, flavine, and a mixture composed of vinum ipecacuanhae, one-half ounce; glycerin, 1 ounce, and liquor arsenicalis, 1 ounce; also powdered methylen blue; but in the author's experience none has given such good results as the solution of arsphenamin.

1. It seems to be definitely proved that the fusiform bacillus and the accompanying spirochete are one and the same, the latter being an evolutionary form of the former but always present with the bacillus.

2. The author believes that Vincent's angina is much more common than is at present realized, and that it is not recognized because of the failure to take a smear, and that furthermore it is frequently mistaken for diphtheria and syphilitic ulcers.

3. It is also probable that the considerable use of candy or proteins with the subsequent lack of oral cleanliness predisposes markedly to this infection; likewise, that poor teeth harbor the organism and that it will manifest itself in its characteristic lesions whenever a suitable opportunity is given. It seems to be more frequent during the winter months.

4. The use of arsphenamin dissolved in glycerin is strongly advised in the treatment of Vincent's angina and infections in which the fusiform bacilli and spirochetes resembling Vincent's organism are found.

Emil Mayer.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Thyrotomy and Laryngectomy Under Local Anesthesia in Cancer of the Larynx.

Moure, E. J.

Rev. de laryngol., etc., Paris, 1920—XLI—1.

Opening the larynx, according to Moure, no longer is a formidable operation. Postoperative bronchopneumonia is no longer to be apprehended. Thyrotomy is a desirable operation in cancer of the larynx when the disease is well limited to one side. Like laryngectomy, it is always to be performed under local anesthesia. Moure has performed in all, thirty-four laryngectomies, of which five died subsequent to the operation. In the last fifteen cases, only one death occurred. The good results he ascribes to improved technic, especially the use of local anesthesia, and the performance of a tracheotomy at least fifteen days before. He does not favor suturing the tracheal opening to the edges of the skin. The introduction of a large canula into the wound, reinforced by gauze, is sufficient. The placing of an esophageal sound and of the "Lombard" canula assists much in the subsequent dressings. Great emphasis is placed upon the care in after-dressings. In Moure's opinion, even if the tumor is limited to one side of the larynx, a total laryngectomy is to be preferred on the ground that it is not more mutilating than a hemilaryngectomy and gives much greater security. When the growth is extralaryngeal well localized on the free border of the epiglottis, it is possible to remove it by the transhyoid route, or better still, the transthyrohyoid. A diffused invasion of the esophagus with involvement of the glands renders the case inoperable. Harris.

Hemilaryngectomy.

Bremond.

Rev. de laryngol., etc., Paris, 1920—XLI—8.

The author is in agreement with others that theoretically hemilaryngectomy is to be reserved for the earliest and most localized form of cancer. He argues, however, that there are cases where a radical operation is indicated and would be refused, and where a less radical procedure might be accepted by the patient.

The operation should be done in two steps. First, the tracheotomy, and second, removal of the hemilarynx, the two steps of the operation to be separated by an interval of several days.

After reporting several operations, he concludes as follows:

1. Hemilaryngectomy is indicated in new growths of the larynx when they are well limited and when the patient refuses a total intervention.
2. The operation is much easier and less dangerous than the total laryngectomy.
3. The patient with his hemilarynx has the possibility of breathing normally and making himself heard. Harris.

V.—MISCELLANEOUS.

Adenoma of Mucous Glands of Mouth, and Macrocheilia.

Hatton, Edward H.

J. Am. M. Ass., Chicago, 1920—LXXV—1176.

Enlargements of the lips produced by disease of the mucous glands are uncommon, and are either inflammatory or neoplastic in character. Volkmann, in 1870, under the name of myxadenitis labialis, or cheilitis glandularis apostematosa, described five cases of a chronic inflammation of the lip mucous glands; all the patients were adults, three had syphilis, and the process was long drawn out with frequent exacerbations. These mucous glands were palpable, the gland ducts frequently dilated, and small cysts or abscesses common. Stomatitis or gingivitis was present to a noteworthy degree in every case, and Volkmann believed that the gland involvement was due to the mouth infection and that syphilis when present was a factor of only secondary importance. A more frequent enlargement is that described as "double lip" by the European writers, especially the French and English, sometimes called hypertrophy of the mucous or labial glands. The enlarged soft lip is covered by smooth mucous membrane, with palpable nodules beneath it. The fold formed by the projecting red portion is more conspicuous when the person is laughing or talking. In the upper lip the fold is divided by the frenum, and the lower is always single.

Of nineteen recorded cases, only one was in a female, thirteen involved the upper lip, nine the lower (this included three of both), five of the lower lip class were in syphilitic individuals, and two were of supposed inflammatory origin. Two were associated with trauma, one patient had misplaced teeth, two had other deformities, and six had syphilis. The neoplastic form was found in the upper lip twelve times and the lower three, and began in childhood, if not earlier, almost without exception. There is no statement anywhere connecting these tumors with malignancy. Excision, if extended to include all of the involved glands of this form, has been uniformly successful.

The term microcheilia therefore has been used to name not only the better known lymphangioma but also these unrelated mucous gland enlargements. It is difficult, if not impossible, to classify these conditions on the basis of any such terminology, and it would therefore seem wise to abandon such descriptive terms as microcheilia and double lip for the more exact names associated with the actual pathologic condition that does exist. Emil Mayer.

Prevention of Respiratory Diseases.

Lynch, Charles.

Med. Rec., New York, 1920—LXCVIII—801.

Our conclusions from our first study were as follows:

1. Influenza, as well as other socalled airborne or respiratory diseases, is essentially a hand to mouth infection.

2. There are major and minor modes of transmission by indirect contact—by the former through tepid mess kit washwater, and by the latter through intermediate inanimate objects, the hand being the conveyor in both instances. Among troops approximately 75 per cent of the cases arise by the major route. This applies to troop transports as well as camps.

3. Transmission by direct contact is only subsidiary to the indirect routes.

4. The adoption of a universal method of washing mess kits in boiling water will enormously reduce the prevalence of all mouth borne infections.

5. The prevention of hand to mouth infections may be accomplished by any measure which will prevent the unclean hnad from visiting the mouth and nose, and by the thorough cleansing of the hand after all such visits.

6. The incubation period of influenza would appear to be from two to three days.

7. An epidemic of influenza among troops may be controlled by elimination of hand contaminated dishwater.

Emil Mayer.

A Clinical Study of Epithelioma of the Lower Lip.

Lain, Everett S.

J. Am. M. Ass., Chicago, 1920—LXXV—1055.

1. Considering the gravity of epithelioma of the lower lip and its frequency in adult males, we believe the subject has not been given the study and attention it deserves by American physicians.

2. As noted by others, our reports also show epithelioma of the

lower lip to be far more common in outdoor workers, and most frequently seen on the side of the mouth where a cigar or pipe is held.

3. Early diagnosis and treatment of the lymph drainage of the lips will materially raise the percentage of cures.
4. Neither surgery, radiotherapy nor any other one successful method of treatment should be used in all cases alike.
5. Radium and the roentgen ray, singly or combined, give the most satisfactory results in a selected class of epithelioma of the lower lip.

Emil Mayer.

Tetany Following Thyroidectomy.

Poppens, Peter H.

J. Am. M. Ass., Chicago, 1920—LXXV—1069.

Owing to the fact that the tetany appeared and disappeared simultaneously with the infection, this was probably the principal etiologic factor. Thyroid extract apparently alleviated the acute symptoms and tided the patient over the critical period.

Emil Mayer.

Plastic Surgery: Its Interest to the Otolaryngologist.

Smith, Ferris.

J. Am. M. Ass., Chicago, 1920—LXXV—1555.

Three general methods cover all types of plastic operations on soft parts:

A. "French Method."—This consists of sliding or stretching of the flap with little twisting or torsion of the pedicle, and is widely used alone or combined with other types for repair in all parts of the body. The essential characteristic is masking a loss of substance. It should never be used in large parietal or total losses of the nose, because rapid flattening and deformity result. Its use in repair of a cavity always demands a lining of mucous membrane or skin.

B. Interpolation.—1. Flaps from the immediate neighborhood, either single or double, with a pedicle which is rotated, twisted, bridged or tunneled. This is the Indian mutilation type of flap. The pure Indian flap was raised from the forehead, rotated on a pedicle and used without lining for nasal repair. This [ap is the method of choice for nasal covering and the method of necessity in covering large losses of the cheek and lips.

2. Flaps from a distance with a tubed pedicle. Tubing of the pedicle is a valuable modification by Major Gillies. This consists in suturing the raw edges of a long pedicle, thus doing away with danger of infection by including the raw surface and furnishing a certain blood supply to a flap at its distal end. Perthe's method of outlining, dissecting and resuturing the flap in its original bed is usually combined with this procedure.

3. Free flaps or grafts. These may be skin, fat, fascia, bone or cartilage.

4. Flaps transferred on a "carrier," usually the arm. This is essentially the "Italian method," which was primarily proposed

for rhinoplasty. It consists in fashioning a pedicle on the arm and later transferring it to the nose with the arm immobilized on the head until new blood supply is established.

In the light of present knowledge, the method has nothing to recommend it in facial repair, and many things to condemn it. The position is torture to the patient, there is danger of emboli in the superficial veins of the arm, infection readily occurs from contact with the nose, and dressings are difficult. Its supporters can only claim that it prevents scarring of the forehead. This is offset by the fact that the texture of the skin is such that its contrast with the face and scalp is very marked.

If forehead skin is not available, chest skin should be supplied by use of Gillies' tubed pedicle.

C. Retrenchment.—This covers operations for reduction of excess tissue and production of a more pleasing cosmetic result.

Emil Mayer.

Society Proceedings.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of Monday, March 1, 1920.

THE PRESIDENT, DR. ALFRED LEWY, IN THE CHAIR.

Paraffinoma.

Dr. Harry L. Pollock presented a patient who had been operated upon for paraffinoma, and exhibited photographs taken before and after the injection of the paraffin and following operation.

The patient was a young lady who had a slight "saddle nose," for which a beauty specialist had injected paraffin to remedy the defect. The paraffin soon produced irritation and a large growth resulted, which included the corner of her eyes and part of the forehead. She consulted a surgeon in Minneapolis, who decided to remove the growth, and immediately after this the nose took on the appearance of acne rosacea. The paraffin was injected eleven years ago and operation was attempted two years later.

When seen by Dr. Pollock two years ago, she presented an irregularly lobulated tumor mass, which caused severe pain in the eyes. For this reason removal was decided upon, so part of the mass was extirpated and the wound kept open. Evidently the air had some effect in dissolving the paraffinoma that remained. After a few months they dissected out the whole thing, so far as they could tell, but after a short time there was a recurrence that was almost like a malignant growth, which went down to the antrum and involved the tissues of the face. Following this they performed a radical antrum operation on both sides, making through and through drainage, and dissected up under the eyebrows on each side to remove the paraffinoma and permitted the wound to granulate in. Many different things were used to assist in healing, but until the institution of radiotherapy four weeks previously, there had not been much change. At the time of presentation the pain was all gone and the wound was healing over. After the wound was entirely healed they expected to do some plastic work, and would probably make a new portion of the nose from a piece of the tibia.

Dr. George E. Shambaugh presented a paper entitled

Discussion of an Old Problem.

Dr. Shambaugh introduced his discussion by relating several experiences that had come to him recently. The first was a case of typical otosclerosis, who had been subjected to a series of operations on the nose and throat, including removal of all four turbinated bodies, resection of the nasal septum, tonsillectomy, and curettement of the nasopharynx, all undertaken with the mistaken idea that the patient was suffering from a form of ear trouble which might be caused by nose and throat conditions. The second was a case sent to him to have all these operations in order to prevent a loss of hearing. The patient was suffering with tinnitus, probably due to the initial stages of otosclerosis. There was no middle ear disease. The third was a patient who was being urged to have a radical mastoid operation on the one ear on which she had to rely for hearing. The examination disclosed a harmless type of chronic ototis media, with a perforation in the anterior segment of the membrana tympani and a slight mucous discharge: an ear condition quite free from any risk of a serious complication. The fourth was a patient who for a couple of months had been suffering from an acute otitis media, with palpable evidence of a softening within the mastoid. This patient had been urged to have the turbinated bodies removed, the septum resected and the tonsils removed, in order to correct the otitis media.

All of these cases presented the most elementary clinical problems which confront the otolaryngologist, and in each instance entirely wrong advice had been given.

Dr. Shambaugh pointed out that this state of affairs is the result of the practice of teaching general practitioners the technic of the operations in the nose and throat, without teaching them the fundamental principles on which the practice of otolaryngology is based. It is a relatively simple matter to instruct students in the technic of operation, but it is a much more difficult matter to teach them to make the proper examination and the diagnosis of the conditions requiring these operations. It is not surprising that the wrong advice is so frequently given or that so many unnecessary operations are being performed.

Dr. Shambaugh insisted that the remedy must be a reversion of the practice of teaching operations to men before they have been taught the principles of otolaryngology and the methods of diagnosing the condition requiring these operations. He insisted that the minimum time to be spent in preparation for the practice of otolaryngology should be one year full time work, in which as much time should be spent in the study of the fundamental sciences of anatomy, embryology, physiology, etc., as in the clinical aspect. The technic of operation should be taught only as the final part of this preparation. The need is not so much for a large number of specialists in this field as it is for a few properly trained men to do this work. We owe it to the public, as well as to our specialty, that we take a definite stand on the minimum requirement of preparation for practice in this field. This is more necessary now than it was some years ago, when it was the custom of general practitioners to treat these cases by means of sprays and topical applications. The teaching of these men the technic of an operation has thrown open the gates for immeasurable harm from unnecessary operating.

Dr. Shambaugh pointed out that this was not a new problem but that in 1907 ("The Preparation of the Specialist," Jour. Am. Med. Assn., 1907, XLIX, p. 540-543) he had written on "The Preparation of the Specialist," in which he had insisted that this work should be undertaken by the university, and that the work should be put on the basis of real graduate work leading to the granting by the university of the higher degree, the degree of Doctor of Philosophy, for example, in otology. That in 1909 he had discussed the same subject in a paper entitled "Postgraduate Instruction in Otolaryngology," which was published in the Laryngoscope ("Postgraduate Instruction in Otolaryngology," Laryngoscope, June, 1909). Again, in 1912, he had discussed "The Specialist in Medicine" ("The Specialist in Medicine," Jour. Amer. Med. Assn., LXIII, p. 1827-29), in which he stated that the real specialist in any subject was one who mastered the subject sufficiently to attack the unsolved problems in that subject. That the specialties were no place for the dilettante or the unsuccessful general practitioner. He also pointed out the analogy between the work of the postgraduate schools in the training of specialists and that of existing preparatory medical schools, and insisted that the proper place for both was in the properly equipped department of medicine of the university. He pointed out that since these papers were written the undergraduate institution in medicine had been taken over by the university, and he believed that the time has come for the passing of the postgraduate school as an institution for training men for practice in the medical specialties. When this work is taken over by the university there will be less effort made to ladle out to the student medical facts in courses devised for this purpose. Instead, the effort will be made to teach these men how to investigate the facts. The chief reason why, from all the men who in the past have crowded our postgraduate schools and filled the courses offered abroad, so few have ever been contributors to the advancement of our specialty, is because these courses have aimed to teach the student the established facts in the specialty, rather than to train him to investigate these facts.

DISCUSSION.

Dr. Norval H. Pierce hesitated to open the discussion because Dr. Shambaugh was quite conversant with his views on the subject. The frequency with which the profession was brought in contact with cases that showed the crassest kind of ignorance regarding diseases of the ear, nose and throat, especially of the ear, was pitiable and a matter of considerable importance. The war had disclosed the fact that a large percentage of men who claimed to be fitted for entrance in the otolaryngologic section of the Army were ignorant of the elements that go to make up a specialist in that branch. The cause of this was two-fold: first, the lack of facilities for training otolaryngologists in this country and abroad and, second, the commercial spirit of the age. If a man could learn the technic of tonsillectomies, he cared very little about the diagnosis of cases that would give him some idea regarding the advisability of tonsillectomy. If he could learn the technic of any operation, the fact of whether or not it was necessary to do that operation was pretty far back in his mind. The man with a family and no other means of supporting them than that which he got from the practice of medicine was a very human individual. It was easy in certain cases for the fee to turn the judgment in the direction of the operation—there was no doubt about that.

Therefore, training in this specialty not only enlightened a man but built up his character. A man who really had as much knowledge as could be obtained in these matters was a good deal better man as regards his medical character than the man who had only a smattering. He did not blame the men especially; the foundation of the trouble was ignorance, not dishonesty.

Dr. Pierce believed with Dr. Shambaugh that the time was rapidly approaching when facilities would be extended to men to fit themselves for a beginning in the pratcice of otolaryngology. One year of intense study was the very shortest time that should be devoted to this preparation. He believed they should begin with the teaching of anatomy and physiology, and with the physics of the specialty, if necessary. Graduates should not be admitted to the latter part of the course, which comprised clinical work, diagnosis and operations, until they had had preparation in the fundamentals. In fact, he thought it would be well for men in different parts of the country to get together and make certain requirements in this line. There might be an exchange of privileges—a man could take the first three or six months in one university and complete the course in some other university, but the whole thing had to be formulated. The fact that the postgraduate course of six weeks was being abandoned in many directions was a sure sign that it was about to pass away.

Dr. Otto T. Freer had not found that the many physicians who have entered into otolaryngology insufficiently prepared have done so from mercenary motives. He thought they merely had no conception of what is asked in effort and fundamental knowledge to make an otolaryngologist. The fault is less with the men than with the poor opportunities for study offered them. Impoverished graduate schools, with insufficient equipment and unpaid teachers, who can give to the school only the time they rob from practice, cannot produce specialists of merit. Reform will not be had until the public appreciates the importance to itself of the best possible educational facilities for the doctor and stops blaming him for its own neglect to supply them. What is needed above all things for him is an unlimited supply of fresh or properly preserved (not formalinized into leather) cadavers for continued, lifelong study of the topographic anatomy and surgery of his chosen specialty. Without such abundance of cadaver material graduate teaching, no matter how much exalted with university formalities and capped and gowned, will lack the power to give the student diagnostic and surgical confidence. Vienna became the greatest graduate school in the world largely because of the immense cadaver material offered there, and because the national government gave the teachers an authority that made the public obedient and respectful to them. The strengthening effect of government backing upon the profession is evident in Michigan, where the general public looks up to the graduates of the University of Michigan with a deference not shown by other States towards their doctors. State or Federal medical schools to replace privates ones would do much to change the attitude of the public towards the profession from one of impertinent doubt into confidence and respect.

Dr. Eugene R. Lewis (Dubuque, Iowa) said he thought it was a fruitful subject for discussion and thought, although it was nothing very new. The same problem had always been present in one form or another. The time was when, if a boy decided to go into medicine, he allied himself with a man who was already in medicine, and after a time he was in medicine, too. These conditions were not satisfactory, and finally certain requirements were stipulated for the degree of M. D. Then arose abuses, the M. D. "diploma mills."

He had heard one of the older triologic members tell how he became a specialist, how very crude his entrance was into the specialty, and yet there was then no other avenue of entrance. He thought another stage in development had now been reached, following a natural course of evolution. The problem was not easy to solve. He asked Dr. Shambaugh if the idea that he had in mind was that a man should go into the study of otolaryngology without an underlying foundation of years of practice. It was a very difficult problem to decide just how much gēneral work a man should have before taking up special work. Everyone had seen the unfortunate narrowness of the man who was "only a specialist," he who had entered his medical school with the intention of becoming a specialist, and had gone through with only perfunctory compliance with the required subjects in the curriculum, but intent only upon his specialty. He thought those men were not capable for the highest type of special practice; for this, he believed, it was desirable that a man should have a university degree, a medical degree, an internship in a good general hospital, and then the practice of general medicine for a certain length of time before becoming a student of otolaryngology. This was a big requirement, but the man who did not do it could not be the highest type of otolaryngologist, for a background of general medicine was necessary for the highest type of any specialty. The profession is not up against a new problem at all, and the present generation would probably see the solution of the problem.

Dr. George W. Boot thought a slightly different view should be taken, which was that if the undergraduates were better instructed in ear, nose and throat work they would demand more of the specialist when they got out of school. The better prepared the student was in medicine, the better prepared the otolaryngologist would have to be to get his work later. If sufficiently well founded in otolaryngology, there would be no danger of his sending his work to a poorly equipped specialist, for he would know a well equipped specialist when he saw one.

Dr. J. Holinger thought that in the training of specialists they ought to take advantage of the opportunities at their disposal at the Cook County Hospital, where there is very good material. When he started work there he made it a point to have a resident assistant for at least a year. The assurance was given him by the Civil Service Board, but after three months the assistant was changed. After another three months there was another change. Such conditions make it impossible to train specialists.

Dr. Holinger agreed with Dr. Shambaugh that many unnecessary operations are done, but sometimes, too, the patient is to blame for this. He cited the case of otosclerosis combined with occlusion of the tubes in a heavy smoker with a pronounced hypertrophy of the lower turbinates. This hypertrophy was removed, which gave much relief to the patient. Three years later the man was again having trouble and someone told him the tonsils should be removed. This was done and again the patient felt better. Owing to incessant smoking, he got into trouble again, and at a third place had another operation performed. It is not always the doctor's fault if unnecessary operations are performed, for they do not always get the truth from the patients. On the other hand, they were forced to admit that they sometimes got results where they did not expect them. An old lady of over seventy years suffered from hard hearing and dizziness, and obstruction of the nose. She had hypertrophic lower turbinals. Dr. Holinger thought that most of the symptoms were due to old age, but on repeated insistence of the patient that something be done for her nose, he removed the free ends of the turbinals. The result was unexpectedly gratifying. Besides a perfectly free nose, all the ear symptoms disappeared.

Dr. Shambaugh (closing) said that where nasal conditions existed which in themselves required correction, they should, of course, be taken care of, but what he wished to emphasize was that the existence of some irregularities of the nasal septum or the fact that the patient has a nose at all, or tonsils, seemed to be sufficient in the minds of many to associate these conditions with ear trouble and to justify operations upon the septum and tonsils.

The question of internes operating upon the nose or throat was a very important one. They were all anxious to do everything they could to develop internes while they were in the hospital. The question of teaching them a technical operation like the septum operation or the tonsil operation hinged on this point: Had they a right to teach people to operate who were not prepared to diagnose the conditions for which they were operating? The decision as to whether tonsils should be operated upon hinged upon a number of important relations. The decision in many cases could not be reached without a postnasal examination. No interne that he had ever seen had ever acquired ability to make a postnasal examination. The decision to operate upon tonsils and adenoids was often made because of conditions found from an otoscopic examination. Dr. Shambaugh did not believe any interne ever acquired enough skill in making an otoscopic examination to determine the existence of those conditions which indicate adenoid and tonsil trouble. He believed with Dr. Holinger that these operations should be in the hands of resident specialists, and could see nothing but harm resulting from training a general practitioner in the technic of a nose or a throat operation.

As to Dr. Lewis' question regarding how much experience in general practice a man should have before taking up a specialty, there was no denying the fact that if a man practiced general medicine for five or ten years he was in a sense better qualified to practice in any special field than he would be if he went directly into this line of work from his hospital interneship. In the same way, a man would be a better laryngologist and otologist if he had five or ten years spent in neurology, etc. It was only another way of stating that a man would be a better specialist if he knew everything there was to know about medicine; but it was evident that this was not possible and that they must have some rational basis upon which to work. In Dr. Shambaugh's opinion, a man who took up a specialty should be a graduate from a first-class medical school and should have an interneship in a general hospital; but he questioned the advisability of expecting these men to spend five or more years in general practice before starting on their special work, which meant, as a rule, from two to three years' preparation.

The solution of this problem would be by cooperation. This was the great advantage of specialization. They did not look with approval upon a general practitioner who attempted to tinker with the specialties. In the same way, the internist had as much justification for disapproving of the specialist attempting to practice general medicine. Their best results were obtained by working in cooperation with men who were specializing in the various lines of medicine. For example, the decision as to whether tonsils should be removed was not one that could be decided in all cases by a man doing the nose and throat work. In many cases the decision hinged upon whether the patient was suffering from a systemic infection and also upon whether there was any other likely focus which might account for the systemic symptoms. In other words, the decision to operate was very often better made by the internist than by the throat specialist.

Dr. Samuel Salinger read a paper on

Primary Periostitis of the Mastoid.*

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*See page 943.

DISCUSSION.

Dr. Otto T. Freer thought Dr. Salinger's paper a very good presentation of the subject of external abscess of the mastoid process. The disease was rare and hard to recognize. In the diagnosis the most important thing was to see the drumhead. Here an ear speculum of the right shape was necessary. Most specula had a conical shape and could therefore not be passed through the external auditory meatus when narrowed by elastic inflammatory swelling, as the yielding of the swollen skin formed an excellent cushion for the cone of such a funnel to wedge itself into, the more one pushed the more it wedged. The ear speculum that suited such a state should have parallel walls and have a caliber of only one-eighth of an inch. With the aid of such a speculum, Dr. Freer had been able to see the membrana tympani, where an ordinary funnel would not penetrate. A neecssary accompaniment of inspection with so minute a speculum was, of course, penetrating illumination, which was not obtainable with a head mirror and only to be gotten with the Kirstein lamp. It was unfortunate that at present no Kirstein lamps were obtainable, but Sharp and Smith said that they would have Kirstein headlamps in the market by July 1st at the farthest. In the interest of bronchoscopy and other deep illumination this is highly desirable.

Dr. Eugene R. Lewis (Dubuque, Iowa) stated that he had a very interesting case in December, following a septal resection in a boy of seventeen, who was in very poor physical condition, and the resection was followed by an acute otitis media. Between Christmas and New Year's he attended some party. The next day the ear discharge ceased abruptly, and within twenty-four hours he had a tremendous swelling of the mastoid, apparently a mastoid abscess. The boy had quite a lot of pain, and it was a typical looking case, with a swelling of the posterior wall. The patient was kept in bed and observed under tentative treatment for five days, but the only result was further dissemination of the swelling. X-ray plates showed intercellular partitions rather clearly. He told the father of the boy that it was a somewhat atypical case and he did not think it was a mastoid abscess, although it was suggestive of that condition. He had enlarged the perforations the first day, but could not get any discharge except a little mucopurulent material which soon ceased. He suggested making a posterior opening for inspection; if it was a periostitis they could save the mastoid, and if not, simple mastoid drainage could be done. This was done under local anesthesia. They denuded the periosteum very widely, looking for periosteal pus or signs of cortical change, which they did not find. They went into the neck for two or three inches and opened up as wide as they could, so as to get free drainage. The wound closed in three weeks, and there was no discharge from the middle ear after the fifth day. He did not know what the cause of the trouble was, but evidently acute extension of the infection caused some interference with the circulation.

Dr. Salinger (closing) said there were some points in connection with these swellings that could be cleared up. He thought there was a field for investigation in reference to the lymphatic supply, which he believed had something to do with the swellings. He did not know why these things would puff up, and when incised, promptly subside. This had been reported a number of times in cases of enormous swellings with pain and edema that recovered after being simply incised and sewed up, but the etiology was not known. The point he wished to make was that with a swelling over the mastoid and a swelling above the meatus, it was only natural to suspect a mastoid infection; yet without a history of previous discharge one might be at a loss. He had not been able to push aside the swelling in the meatus with a funnel (as suggested by Dr. Freer) because of the great pain. He knew that Dr. Freer was a great enthusiast about the Kirstein light and agreed that it was a valuable adjunct in the examinations.

THE CHICAGO LARYNGOLOGICAL AND OTO-

Meeting of April 5, 1920.

THE PRESIDENT, DR. ALFRED LEWY, IN THE CHAIR.

Otitic Meningitis.

Dr. J. Holinger presented a nurse who had suffered from suppurative otitis with swelling and tenderness over the mastoid and brain symptoms for several weeks. She heard only loud conversation in the right ear. After the mastoid was opened improvement for some time was noticed, but all symptoms, especially the unbearable backache, became worse. Lumbar puncture showed fluid under increased pressure, turbid and full of streptococci. After an improvement of several days, all symptoms reappeared, and especially the backache was severe. The wound looked well. With the intention of draining some of the cerebrospinal fluid, and at the same time looking for a possible brain abscess, the wound was enlarged and the dura over the cerebellum and over the temporal lobe were incised. Several stabs in the cerebellum and the temporal lobe showed no pus. The result was temporary. To relieve the backache, ¼ gr. of morphin was ordered every two hours by the interne without result. It was discontinued and 15 grs. of aspirin every evening seemed to have a very beneficial influence. The unusual features of the case were:

1. In the presence of symptoms of meningitis like slow cerebration, Babinski's and Kernig's symptoms and impossibility of approaching the chin to the sternum, the patient was able without pain to turn the head from side to side. Headache and sleeplessness were absent during the whole duration.
2. The diagnosis of meningitis was made certain by the finding of turbid cerebrospinal fluid under high pressure, containing many streptococci. This usually makes the prognosis fatal.
3. The decided turn for the better came with the medication of aspirin.

Cholesteatoma.

The second patient was a man of thirty-six, who came on account of loss of hearing in his right ear since last summer. He was treated in 1906 by Dr. Hardie for humming in the ear. After removal of adenoids and a few inflations he was cured in the summer of 1919. He never had humming of ears or pain. At the end of January, 1920, Dr. Holinger found on the roof of the external canal crusts which were removed with difficulty. A large marginal perforation in the drum membrane was seen and some granulations on the roof of the canal. In the course of about six weeks two pieces of cholesteatomatous masses, the size of a pea, forced their way through the perforation in the canal and through the granulations. At the time of presentation a third piece, a white mass between the red crown of granulations, was working its way into the external canal.

DISCUSSION.

Dr. Robert Sonnenschein thought the first case was probably one of streptococcic meningitis. That these may recover at times was shown in a case reported by Dr. Weaver about a year ago. Dr. Sonnenschein saw this patient during Dr. Friedberg's absence on military duty. The patient was a nurse who contracted the disease while on duty in the hospital. All the typical signs of meningitis were present, but there was no involvement of the nose, ear or throat. Several spinal punctures were made and the antistreptococcic serum injected. The patient made a complete recovery after three or four weeks.

Dr. Harry Kahn said he had seen the side to side movement of the head in a case of meningitis under his care.

Dr. Norval Pierce said it was very unusual for a case of meningitis to recover when viable microbes were found in the cerebrospinal fluid. None of his cases had recovered, and he wished to know whether the microorganisms were viable. Dead organisms could be recovered from a localized meningitis when the prognosis was less unfavorable, but when the microorganisms were viable it made the prognosis very grave. The fact that there was no headache was difficult to explain, especially as the spinal fluid seemed to be under pressure. Headaches were caused by increase in the cerebrospinal fluid and not by inflammations per se. Another colleague had a case of meningitis that had been going on for some time, from which the pneumococcus had been recovered. The patient had not yet recovered, but showed improvement. (The patient has since died.) Dr. Pierce thought one should be careful in giving even a hopeful prognosis in a case of meningitis where viable organisms had been recovered. It must also be remembered that accdiental contamination occurred in these cases from the skin, and therefore the technic in the spinal puncture and examination of the fluid should be very exact and very thorough. Much deepnded upon the fact as to whether viable microorganisms were recovered. In his opinion Dr. Holinger's case was not a general, spreading, suppurative meningitis, but in all probability a localized meningitis. How the viable microorganisms got down into the lower portion of the spinal canal it was difficult to say.

Dr. S. A. Friedberg thought that much depended upon the virulence of the microorganisms. It is well known in sinus thrombosis for instance, that the finding of hemolytic streptococci in the blood cultures, does not necessarily imply an unfavorable prognosis. Several cases that had come under his observation have recovered. Virulence tests on guinea pigs were negative. By analogy, it is possible that we may also have bacilli of low virulence in the spinal fluid.

Dr. Holinger (closing) stated that the cerebrospinal fluid was reported to be swarming with streptocci, not one here and there as was often the case. The pathologic findings in the laboratories of the Cook County Hospital are pretty reliable.

Dr. Holinger was glad to hear that the peculiarity of free movement of the head from side to side in presence of absolute impossibility of movement of the head forward, was noticed elsewhere, as Dr. Kahn mentioned. He would like to know whether this is in connection with the favorable termination of the case, in other words, whether this peculiarity is of prognostic value.

Dr. Stanton A. Friedberg read a paper on

The Carrier as a Factor in the Control of Diphtheria

DISCUSSION.

Dr. W. W. Hamburger (by invitation) said that he was quite at a loss to discuss Dr. Friedberg's paper on diphtheria, because his experience was confined almost entirely to the streptococcus. During his military service he worked during a period of eleven months on the streptococcus carriers, particularly in measles. They had isolated the carriers from the noncarriers and studied the effect on the carriers throughout the camp. In the early winter of 1917-18, when the measles came into Camp Taylor, all the men were very carefully examined. The measles cases entering the Base Hospital through the receiving ward were swabbed by the nose and throat surgeon and examined for streptococci, blood agar plates made, and the cases labeled either as carriers or noncarriers. At the end of twenty-four hours they were sent either to the measles carrier ward or to the noncarrier ward, so at the end of every twenty-four hours the receiving ward was emptied for new cases coming in that day. During the period in the observation ward the cases were carefully cubicled, the attendants carefully masked, and all measures of quarantine were used that could be carried out. The study resolved itself into a study of the complications arising in the carrier and noncarrier wards. The cases coming in during the height of the epidemic showed that seventy-seven out of one hundred carried streptococcus in the pharynx. As to complications, about 30 per cent developed in the 500 cases so studied. Of this 30 per cent, 6 per cent developed in the noncarrier wards, and 24 per cent in the carrier wards. The complications were the usual complications of measles, otitis media, acute sinusitis, acute bronchopneumonia, severe bronchitis, erysipelas in some cases, etc. The study covered a period of about two months, and they concluded that the segregation of measles patients into carrier and noncarrier wards was advantageous, resulting in a decrease of complications, for they proved that it cut down the percentage from 30 per cent in the carrier wards to 6 per cent in the noncarrier wards.

Later experiments showed that some of the complications were mixed infections. Sometimes they recovered pure streptococcus, sometimes pneumococcus, and sometimes mixed cultures. While it was found that complications could be diminished by carrier segregation the quarantine with masks and cubicles was not perfect. A survey was made every week and showed from time to time the development of carriers in noncarrier wards, and it was very often very difficult to determine the source of the carriers. Several times they found it occurred in attendants on the wards. Nurses or orderlies were found to be carriers and then were promptly excluded.

This work was carried further by immediately swabbing the new recruits as they came off the train into camp. Upon entrance into the camp about 15 per cent were shown to be carriers. At the end of six months this had been increased to 83 per cent, showing that the carrier state, at least in this study, had developed from contact with their fellows, and that finally the camp became heavily seeded with streptococcus. Another interesting thing was the variation in carrier per cent in epidemic and nonepidemic periods. In nonepidemic periods only 8 per cent were carriers, while 35 per cent was found during the period of epidemics.

During the height of the epidemic Dr. Hamburger visited Camp Grant and saw Dr. Capps and his method of masking which was in use there, and as soon as he got back to Camp Taylor he instituted the same method. While he felt that a step in advance had been made, the masking was not 100 per cent efficient.

To decide on the efficacy of the mask and cubicle method, they took a ward and planted a bed with a carrier and the next bed with a noncarrier and so on. In that ward it was absolutely impossible, by the most careful measures, to maintain that carrier separation, for at the end of one week, there were only three noncarriers left out of an initial number of twenty-five. So it seemed that the only way a separate noncarrier study could be made was that the ward itself should be maintained as a clean ward throughout, with all the unclean or carrier cases put into carrier wards.

As to the question of the meningococcus carrier, the feeling at Great Lakes was that this carrier was not of importance in the meningitis, while at Camp Taylor they searched for these carriers and kept down their meningitis pretty well, still they did not think that the carrier was much of a factor in the spread of meningitis. There were so many other conditions that entered in, that the simple finding of a carrier or noncarrier would not decide the question.

Another interesting angle of their work which checked up with Dr. Friedberg's was the question of how long the carrier state is maintained after an acute illness. They swabbed all the convalescent measles cases on discharge from the hospital, finding about 72 per cent carriers after recovery from their measles, in spite of all local treatment. In the laboratory they tried out various antiseptics in various strengths, and various combinations to see what was a useful antiseptic to use for killing the streptococcus, and found a 2 per cent iodoglycerin in vitro was the most valuable; but this proved absolutely useless as a gargle. A certain group of the 72 per cent convalescent carriers were put out on porches, with abundant fresh air and sunshine and ample food and some exercise, and within forty-eight hours the carriers dropped from 72 to 40 per cent. Following this they gave up all local measures and kept the patients for a week under conditions of fresh air, sunshine and good food, and the percentage of carriers dropped promptly.

Tests had demonstrated that in the parts of the camp where measles were prevalent the dust of the barracks showed a high percentage of streptococcus, while in the carrier wards the percentage was very low.

Capt. Kleinman (Fort Sheridan, Ill.) said that he had charge of a group of diphtheria carriers in November. Then cases in all were cultured, both nose and throat, for the first time, and out of that group two were found to be ethmoid carriers, and they had been longest in the hospital. The study was continued until after the first of the year and out of the seventeen cases about 35 per cent were found to be ethmoid carriers. Since that time all of the cases have been cultured, both nose and throat, and the treatment with argyrol tampons, as outlined by Hazeltine, has been carried out. In this way the time lost in hospital had been cut down. The ethmoid group averaged thirty-three days and the nonethmoid about thirteen days. The treatment consisted of quarantine, masking when out of their ward, applications to the nose and throat, and gargles. Cultures were made Mondays, Wednesdays and Fridays, and three consecutive negatives from both throat and ethmoid region were required for release. Tonsillectomy had not been done.

Major W. F. Von Zelinski thought the carrier question was a collosal one and could be discussed indefinitely. He had seen a good deal of it in regard to measles, meningitis and diphtheria, but had been unable to form any conclusions. He had listened to a very exhaustive paper by Dr. Davis at a recent meeting of the Society and left with the conclusion that everybody had organisms in their throat all the time of one kind or another. The virulency of these was a big question and one he did not wish to discuss extensively. The question of testing them out for virulency was a question of testing out immunity; on one person organisms might be very virulent and in another person not so virulent. They seemingly became more virulent by passing through a number of people, and also seem to lose their virulency in time.

He had hoped to hear something said about the treatment of carriers. During the last few weeks at Fort Sheridan the carrier patients (diphtheria) had been confined under treatment for thirty to thirty-three days. Recently no local treatment of any sort had been used, for they had found that on a simple gargle they became free from organisms as quickly as with the local applications used before. They had experimented with injection of the Schick serum and found that some of the men who had been free of the organisms for a number of days gave a positive reaction, and some who still had them gave a negative.

Major Von Zelinski was stationed at Camp Wheeler, Ga., from December, 1917, until April, 1918, and in the epidemic of meningitis in that camp there were no active cases in his regiment. The central inspectors came over to his infirmary with the dichloramin T spray and he was instructed to spray certain men. They took some cultures at different places, and if a carrier was found they swabbed all the men in that tent and then went into the next, gradually widening the circle as carriers were found. This was ineffective treatment, because it was impossible to reach all the places where the germs might locate. At that time the troops were receiving instruction in the use of gas masks, and they allowed the men to pass through benzolchloride for about thirty seconds. Major Von Zelinski thought this might be an effective antiseptic that must certainly reach all the areas in the nose and throat, and that it might be a good idea to pass all the men through the gas house. The Chief Surgeon was against it, but he put the matter up to the commanding officer, who was enthusiastic about it. A bunch of men were taken up and swabbed before they went in and swabbed when they came out, and it was found that after this experience they were free of everything except the micrococcus catarrhalis. They then used this treatment on the carriers and found it reduced the period of isolation for fifteen days. While in Europe he saw a statement in a French medical journal that the Germans had been using this treatment, and ascribed the value of the effect to the fact that the treatment practically flushed all the mucous membranes. From the standpoint of treatment this was the most effective thing he had found. The bacteriologist said the meningococcus was pretty well kept away by this treatment, and one or two treatments was all that was required. They tried it on the pneumococcus and they remained away for two days. He mentioned this simply for what it was worth. The question was much too big for him. Theoretically, if all the laws of isolation were rigidly enforced it would be necessary to lock up everyone, for everyone carried something all the time, and just how dangerous these microorganisms were was yet to be discovered.

Dr. S. A. Friedberg (closing) said that an underlying pathologic condition must be present in order to establish or maintain the carrier condition. In the presence of epidemics in organizations or closely associated groups, the bacilli may also be found in normal conditions of the nose and throat; however, their presence is usually of a transient nature and they are easily gotten rid of.

In answer to the question as to immunity to diphtheria in children after the removal of tonsils and adenoids, the speaker did not believe any was conferred. The susceptibility to infection, in the absence of suitable lodging places for the growth of the bacilli, was materially lessened.

Dr. Hamburger had mentioned that they had taken air cultures in order to determine various sources of dissemination. In Dr. Friedberg's work, the cultures were made in every possible manner, and from every source including air, gas masks, kitchen utensils, etc. From the results, it was impossible to draw any definite conclusions. Very evident factors in the spread of disease were found in the main mess halls, large out-patient departments, and carelessness or ignorance as to necessary precautions to be carried out.

From what one of the speakers has said, there seemed to be a little uncertainty in regard to virulency and avirulency of the microorganisms. It is a well established fact that a virulent bacillus does not lose its virulency, nor is it possible for an avirulent bacillus to become virulent. The virulency of the bacillus is determined by guinea pig innoculation and not by the fact that a person may contract a severe clinical case by having been exposed to a patient only slightly ill from the disease.

Dr. J. Holinger read a paper on

Tonsillectomy in the Presence of a Peritonsillar Abscess

ABSTRACT.

The removal of the tonsils in the presence of a peritonsillar abscess is a procedure which as yet has undeservingly not many friends. Still it is certainly a logical operation, as the tonsils are the center of the trouble, and sooner or later have to come out, because peritonsillar abscesses often recur. The objections are more in the nature of prejudice which is not borne out by experience. The recovery after the removal is rapid. It does not take any longer than after an ordinary tonsillectomy.

The operation is more difficult than an ordinary simple tonsillectomy and the general anesthesia has to be given by an experienced anesthetist. The hemorrhage is usually more severe, but can be controlled by the usual methods. The anatomic conditions are more complicated on account of displacements by the abscess which may develop above or behind or directly lateral of the tonsil, or in the tonsil itself, thus dividing the tonsil in several pieces. The method of removal is by means of forceps, sickle-knife and snare. Septic symptoms which are often present in cases of peritonsillar abscess usually disappear in the first twenty-four hours, and albumen in the urine within the first two or three days.

DISCUSSION.

Dr. Louis Ostrom (Rock Island) said that eight years ago he started work of this kind and he had never seen a case that had not had just as good, if not a better, convalescence as a normal tonsillectomy. In the A. E. F., at Coblenz, it was put up to him to assume the responsibility. He was told by some that it was a criminal procedure, but every patient made a wonderful recovery (perhaps good luck), while at the same time all kinds of complications followed tonsillectomies in normal cases (perhaps bad luck). If the patient had double quinsy he operated just the same. His experience with anesthesia had been entirely local (one-tenth to one-fifth per cent. of cocain with adrenalin) except in children. He had had no trouble with this and saw no reason why one could not obtain perfect anesthesia. From the time the quinsy first appeared to periods ranging from a few weeks to several months he had had no difficulty in securing complete anesthesia. He never urged or tried to persuade a patient to have the operation done, but after explaining the matter thoroughly most patients demand it. In many cases the pillars had been a solid mass of scar tissue and the abscess had burrowed outside the constrictor muscles, exposing the large vessels. In only one of those cases he had some hemorrhage that was troublesome. In this case he had used a piece of gauze, taking a stitch on the side of the posterior pharynx and away forward on the side of the jaw to hold it in place. In this instance the result was good. The records at the eye, ear, nose and throat hospital, at Coblenz, will show that the novocain collapse was just as frequent as from cocain. He made the first injection to the side of the uvula, going up and trying to follow up to the hard palate, down to the base of the anterior pillar, then behind, and infiltrating between these three points. In the paratonsillar abscess the constrictor is nearly always laid bare by the abscess itself. No anesthesia is needed through the capsule at this locality. In no instance had any of his patients complained of pain. The cases thus operated would probably reach two hundred or two hundred and fifty, and in all the anesthesia was entirely successful, even when done on both sides, when the swelling had almost entirely closed the throat. Using a large quantity of the anesthetic had no bad effect so far as healing was concerned. He was guided entirely by the sensations of the patient; if they felt the work on the tonsil, he used more anesthetic. If he expected to use a large quantity of anesthetic he would use even a weaker solution and depend on infiltration of the surrounding tissue.

Major W. F. von Zelinski said that in one case like this which had been operated under local anesthesia, in which there was nothing particularly difficult about the anesthesia, the patient afterward developed pneumonia, which he attributed to the aspiration of some pus. He had had two cases, and thought there were two points to consider: one, the hemorrhage was very severe, and the other was the danger of pneumonia. He did not care to take out any more tonsils when there was any paratonsillar abscess, but thought it much simpler to drain the abscess first and believed the chance for complications was less when this was done. He thought even Dr. Holinger would not deny that he was taking a chance of having some of the pus escape and set up a secondary infection in the lung.

Dr. Norval H. Pierce thought that this was such an unsurgical proposition that he must say something on the subject. Why a complete local anesthesia should be obtained in this region in the presence of inflammatory action when one was unable to obtain anesthesia in other parts of the body under the same conditions, was very hard to understand. He had some difficulty in producing local anesthesia even in cases where the paratonsillar abscess had been evacuated and some time had elapsed, because of the scar tissue that is produced. The excision of such tonsils is likely to be painful, although he thought he injected as deeply as the previous speakers. Surely one could not get local anesthesia to any great degree in inflammatory conditions, as was proven in the local anesthesia of the mastoid. One might as well not use any anesthesia where infiltration of the mastoid region had occurred or where there was a subperiosteal abscess. Dr. Pierce could see no advantage in this method of operating, and Dr. Holinger, in his paper, provided enough argument against it to discredit the operation. Dr. Holinger had stated that he was limited to a general anesthetic, which in this condition is the most dangerous anesthetic; he stated that the pus gushed out from various pockets and he believed this was a great menace under general anesthesia, inasmuch as it was likely to get down into the bronchial tubes and produce pneumonia. He said the hemorrhage was much greater, and this again was against the operation; his operation was inexact, inasmuch as he discovered that he had not completely removed the tonsillar tissue; these facts were enough to discredit the operation. It was more dangerous, more difficult, less complete and nothing was gained by it. Dr. Pierce thought it was better practice to evacuate the abscess, which was not difficult, and allow a certain time to intervene before performing the tonsillectomy, when it could be done under local anesthesia without the dangers incurred in this procedure.

Dr. T. W. Lewis said that he had taken out the tonsil in the presence of an abscess repeatedly, but did not do it as a routine. He had stumbled on the removal of the tonsil in the presence of an abscess inadvertently; in removing a tonsil he had discovered an abscess which he had no suspicion of before operation, and that led him to think of the possibility of the removal of the tonsil in the presence of an abscess. Subsequently he had operated to evacuate an abscess and found before he discovered the abscess that the tonsil was almost completely enucleated. He then went on and took out the tonsil, but did not remove the second tonsil at that sitting. Subsequently in dissecting the tonsil to evacuate an abscess he found that the abscess was so low and external to the tonsil that the tonsil was again almost completely euncleated before the abscess was evacuated. Dr. Lewis was rather inclined to agree with Dr. Pierce that the operation was not in accord with strict surgical principles.

As for the anesthesia, it seemed to him that in the presence of an abscess in this location a general anesthetic was absolutely contraindicated. He would not think of giving a patient a general anesthetic and evacuating any large quantity of pus into the air passages. Sometimes the pus was under such pressure and was present in such large quantity that the whole throat filled at once and under a general anesthetic some of the pus was almost certain to be aspirated. It was not always possible to have an aspirator in position at the time the pus began to flow or to remove it at the desired time. He was still in doubt as to whether it was advisable in all cases to remove the tonsil under such conditions. In operating on a peritonsillar abscess he always endeavored to dissect the tonsil from its bed rather than attack the abscess through the pillar.

Dr. J. Lipschutz thought it was interesting to note the different attitudes of surgeons toward two similar conditions. Most surgeons think that the tonsils should not be removed in the presence of a peritonsillar abscess, and yet in cases of panophthalmitis, hardly anyone would advise incision of the eye with drainage, following it later with enucleation of the eyeball. Personally he would not care to remove tonsils in the presence of a peritonsillar abscess yet he wondered why the same did not hold true in panophthalmitis.

Dr. Norval H. Pierce said that it was very difficult to aspirate pus into the bronchi from the eye, and the control of hemorrhage in the eye socket was very much easier than control of tonsillar hemorrhage, so the conditions were entirely different. The dangers of a general anesthesia did not enter into the operation for panophthalmia as they did in the operations on the throat, which made removal of the eye a very much simpler procedure.

Dr. J. Holinger thought it was a matter of individual opinion whether an operation of removing the tonsil in the presence of an abscess of which it is evidently the cause was considered surgical or nonsurgical. If one could show that after the incision of the abscess a second operation of removing the tonsil was avoided by this method, and that the experience of two men during a number of years had not produced any of the bad consequences that were supposed to be due to that special procedure, he felt that it should not be condemned. Neither Dr. Ostrom nor Dr. Holinger observed abscesses of the lungs or any cases of pneumonia following these operations, possibly because of good luck. The extirpation of the tonsil in the presence of an abscess is usually much easier than later on. Everyone had the experience of how difficult it was to dissect out a tonsil where there had been several peritonsillar abscesses in the course of preceding years. Large masses of scar tissue were found radiating in all directions and all the tissues were much tougher, so that it was practically impossible to pull the tonsil out of the niche in order to dissect it. The period of recovery, too, is much shorter in the first instance. Some cases of peritonsillar abscesses lasted six weeks and even three months, but with his procedure the patient was well within a week. He doubted if one was justified in calling such a procedure unsurgical. It was peculiar that those gentlemen who tried this operation were in favor of it and those who condemn it admit that they never tried it.

THE CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of May 3, 1920.

THE PRESIDENT, DR. ALFRED LEWY, IN THE CHAIR.

Cholesteatoma.

Dr. J. Holinger reported on the case shown at the April meeting. After showing the patient in the meeting of April the masses were removed and the perforations in the membrane and in the roof of the canal closed temporarily. About three weeks later it opened again, and through the roof of the canal a fourth lump of cholesteatomatous matter was discharged, which was offered for inspection. The opening at this time was closed except in two or three moist spots. The patient's hearing was improved and he felt much better.

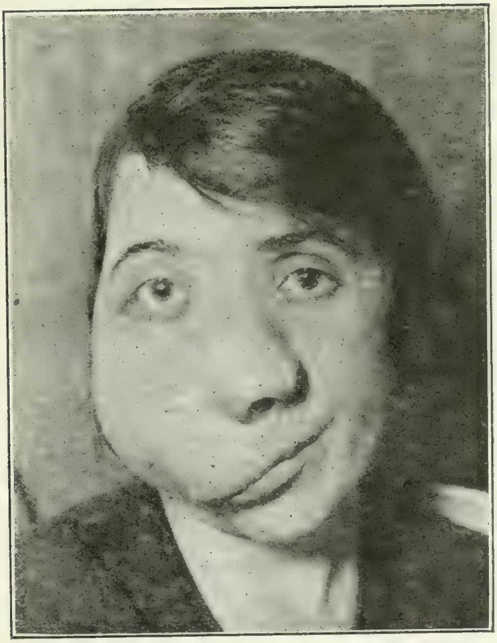
The discharge of cholesteatomatous globules was described more than twenty-five years ago, but that in the course of three months four masses of the size of a pea should be discharged was unusual. Furthermore, that the opening in the membrane and in the roof of the external canal closed teaches that we may have an accumulation of cholesteatomatous masses in the middle ear and antrum in the presence of a practically normal membrane and canal.

Fibroma of the Antrum.

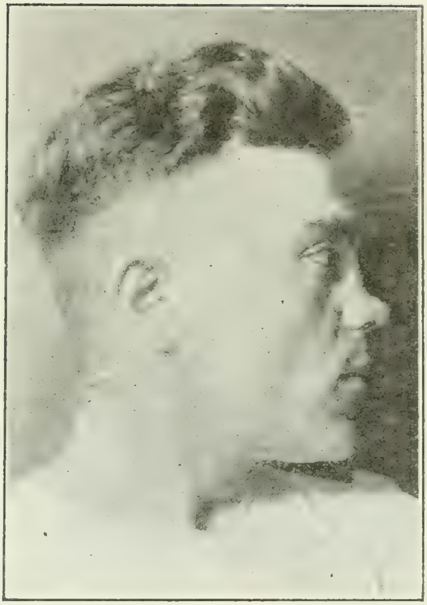
Dr. Austin A. Hayden showed a patient with a tumor originating in the antrum, filling the entire side of the nose and extending out into the cheek, which had been growing for ten years. The patient had received five doses of radium in the past month, with considerable reduction of the growth. The size of the tumor and the history were unusual. The growth was a fibroma, probably of the mixed tumor type, but the pathologic report had not yet been received. Radiograms showed destruction of practically all of the teeth in the right upper jaw. The tumor was about the consistency of an overripe orange. The Wassermann reaction was negative and there was no history of syphilitic infection. (See photographs of case.)

Saddle Nose.

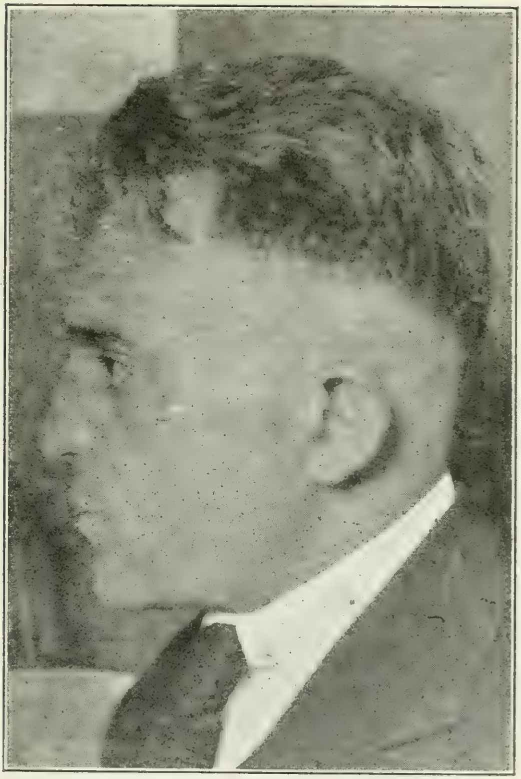
Dr. Hayden also presented a patient whom he had operated for a saddle nose, which resulted from trauma from a horse kick a year and a half previously, and showed a photograph of the patient before operation. A strip of cartilage one and one-fourth inches long had been taken from the nose of another patient, who was having a submucous operation done at the same time. Careful tests (blood-Wassermann) showed conditions to be favorable for the use of the cartilage. The operation was performed under local anesthesia, 1/10 of 1 per cent cocain being used subcutaneously. The incision was made well above the mucocutaneous junction. The periosteum and skin were freely elevated with an ordinary straight submucous elevator. Two implants were made, a long one of cartilage and a shorter one of bone, the bone being placed below. The cosmetic result was excellent. (See photographs.)



Tumor of Face.



Saddle Nose—Before Operation.



Saddle Nose—After Operation.

Paper: "The Whys and Wherefores of a Vestibular Examination."*

By Dr. Lewis Fisher, Philadelphia.

Dr. Fisher thought that the time had passed when it was necessary to do any preaching about the value of an examination of the entire inner ear. It is pretty well admitted that a complete ear examination is very useful in many ways. He presented three case histories and used them as a text for his remarks.

(Dr. Fisher than gave a lantern slide demonstration of charts and photographs.)

These presented a schematic outline of the nerve pathways in relation with the inner ear, as far as known to date. Taking up the three case histories in detail he pointed out the abnormal or absent reactions found on examination of these patients. With the conception of the nerve pathways of the vestibular apparatus as demonstrated on the schematic charts, these abnormal responses suggested certain locations of the lesions in these cases. Subsequent autopsies verified these suggestions.)

DISCUSSION.

Dr. Thor Rothstein said that when the speaker admitted that there were many cases which he did not know what to make of, it made him feel at home, because the same thing had happened to him. He was familiar with Dr. Fisher's work and the published work in connection with Jones, and that book is so lucid and clear that anyone who reads it must do so with awakened interest in all the diseases of the internal ear. It had been a great pleasure to him to hear Dr. Fisher. It was by this means that a very good working basis would be furnished that would give a foundation upon which one might try to make a diagnosis with an insight that had not existed before. The vestibular tracts had always been very mysterious to him, but there existed in these sufficient tracts to make it possible that Dr. Fisher was correct in his idea of these different parts. It was, of course, necessary that much work must be done, and the testing of the internal ear and the whole apparatus could not very well be done by anyone except an otologist, because it is necessary to have great experience to be able to judge of the results. For that reason there should be close cooperation between the otologist and the neurologist in these cases. Dr. Fisher had very clearly pointed out the difficulties; the difficulties in the central and peripheral portions, and the difficulties with a tumor that lies in the cerebellar pontine angle. Dr. Rothstein had observed many of these difficulties and thought there was always room for doubt as to whether it was possible to draw certain conclusions from an examination. For instance, in cases where there are severe attacks of vertigo in migraine, and also in cases where the vertigo is not so violent but remains for a longer time, there may be spontaneous past pointing and absence of the turning past pointing. Although the past pointing is very frequent in these cases, it is irregular and limited many times to jerkiness, and he wished Dr. Fisher would explain this. There were also other points for the man who is not very well versed in this examination. For instance, in the cases where there are ataxias; in these cases there may be the phenomenon of past pointing, but in the few Dr. Rothstein had seen it had often been irregula rand might be the cause of mistakes. So there were many different things in examining these very dffiicult cases which make it necessary that the man who makes the examinations must have great opportunity to observe what happens in these cases. In an individual that has been considered apparently normal, in whom it has been impossible to demonstrate any kind of disease, the accuracy with which the tests are made is not very good, not even in those who have lost past pointing.

In closing, Dr. Rothstein thanked Dr. Fisher for what had been to him a very impressive and interesting exhibition.

Dr. Hugh T. Patrick said he did not know very much about the matter, but the thing that pleased him most of all in Dr. Fisher's presentation was his extreme modesty, and the very small claims he made for the value of the examinations. He thought that in the past the value of the tests frequently had been overestimated. He thought Dr. Fisher would agree with him that it takes an enthusiast to make progress. But the enthusiasts who lead generally go a little too far and have to be checked up a bit, and he thought this applied to the men who had given us this very great addition to medical science. The moral was that these examinations should be made with extreme care and exactitude, and he believed that no man should allow himself to draw conclusions unless he had done enough of the work to be a real examiner and not a pseudo.

Dr. Patrick had an impression that a good many of the conclusions where the lesions involved the central nervous system have been based on tumor cases. Intracranial tumor cases are the worst cases in the world as a basis for refined localization. They have symptoms due to increase of intracranial pressure and to the peculiar way in which this pressure is exerted. This accounts for some of the symptoms at a distance. They are poorly adapted for localization of function, identification of paths or anything of that sort. Dr. Patrick thought the thing that was needed was a series of thrombotic cases carefully worked out. Such a series carefully observed and then carefully worked out anatomically would be a reasonable basis for anatomic and physiologic conclusions. In other words, the lesions which approximate what Horsley, Beaver and Clark did and others are trying to do—this is, make a limited lesion in the brain, will be those on which one might base a dogma of localization; not the cases of neoplasm or other things which cause increase of intracranial pressure.

Dr. J. Gordon Wilson said the members of the society were delighted to have Dr. Fisher with them and had listened with pleasure and no little instruction to his presentation of this important subject. The School of Pennsylvania had focused the attention of neurologists on the possibilities that can come from a careful investigation of reactions from the ear. They have shown admirable team work in their clinical studies, and to these have been added in many cases the pathologic postmortem examinations. While one can have nothing but praise for such careful reports, one may well be excused from hastily accepting some of the deductions based on them.

There are some generally accepted principles which are of aid in interpreting vestibular reactions:

1. If labyrinthine stimulation produce deviation but no nystagmus, then there is a lesion of the cerebral hemisphere near the posterior end of the temporal lobe on the side of the slow deviation. This was shown experimentally by Dr. Pike and Dr. Wilson and reported in a contribution to the International Congress of Medicine in 1913, and has been confirmed by clinical cases with postmortem findings, one of which was reported by Dr. Fisher in his address.

2. Nystagmus, vertigo and pointing produced by labyrinth stimulation are exaggerated in cerebral disease, probably due to loss of the controlling influence of the cerebral cortex. Here we have possibly the explanation of their exaggeration in neurasthenia.

To these the speaker added two other points which can be easily tested and which deserve consideration: (a) The threshold for nystagmus lies below that of vertigo, i. e., the motor reaction comes first. (b) The interpretation of a perverted eye reaction, for example, rotatory nystagmus following stimulation of the horizontal canal, must be interpreted with caution for the following among other reasons:

1. When nystagmus in animals deprived of one labyrinth is fading away the horizontal frequently gives place to a rotatory.
2. On stimulating the labyrinth with an electric current of energy far below that producing typical nystagmus, a rotatory movement is first produced.

Too much stress is apt to be laid on pointing errors. They are frequently irregular and an average of repeated examinations are required to arrive at accurate data. As Dr. Fisher said, pointing is a cerebral act, and probably the cerebellum comes into play to influence the accuracy of the movement. That does not necessarily require a special cerebellar center for each particular movement as has been urged. A considerable number of presumably normal individuals do not give a typical pointing either before or after turning, and a typical error may only appear after repeated rotation trials. As a general rule, we may recognize that deviation of the arm is normally produced by rotation. Dr. Wilson urged that we do not lay undue stress on a diminution and be careful in our interpretation of its absence.

Further, he believed it a mistake to lay too much stress on the degree of postrotatory vertigo or even of its absence. Mygind found that in a series of normal individuals examined only 34 per cent had postrotatory vertigo and some of these only after repeated rotations.

In regard to the separation of the fibers from the horizontal and superior canals in the pons and medulla, we must recognize that Dr. Fisher claims only the possibility of such, supported by clinical observation and postmortem examinations. One may hope to have supporting microscopic findings. Dr. Fisher recognizes that so far no experimental or anatomic findings support this hypothesis, and readily acknowledged that it is not satisfactory to rest such an important point on variations or alterations of pressure in the brain. So far Dr. Wilson's results have been negative. Recently he had an opportunity to examine repeatedly a case of probable interference with the circulation in the posterior inferior cerebellar artery such as Dr. Fisher had quoted. In this case the area involved was evidently smaller than in his. There was evidence of interference with the vestibular mechanism on the side of the lesion. There was absence of pointing error in caloric stimulation from both sets of canals on the side of the lesion, and while on rotation pointing irregularities following stimulation of the horizontal and of the perpendicular canals were present, these were too irregular to support any deductions with regard to separation of fibers. But it should be recognized that one positive finding is worth a dozen negative.

There was much of Dr. Fisher's paper with which one could agree, and the speaker admired his presentation of the work done. He had focused attention on a very important subject and shown how clinical cases are to be examined and may be explained, and how the otologist can be of assistanec to the neurologist.

Dr. George W. Hall was interested in the case referred to by Dr. Wilson. In the last issue of the Journal of the American Medical Association, he reported a case of occlusion of the posterior inferior cerebellar artery, in which the vestibular findings were worked out by Dr. Brawley. He did not know whether Dr. Fisher had seen that article. The trouble with the posterior cerebellar artery occlusion is that the symptoms are not the same in all the cases. In some cases the lesion may be sufficient to produce pressure on the opposite side of the brain stem, as had happened in this case. The lesion was on the right side, but the man had disturbances on the left side of the brain stem as well, although they were slight. In the case referred to by Dr. Wilson the findings were very much more limited, and he believed the findings were more accurate than in the other case. He was interested in the vestibular findings because so far as he could find out Dr. Fisher's report on involvement of the cerebellar artery was the first on record in which the vestibular findings were recorded, and the case they were working on was the third in which the ear findings had been worked out with any degree of accuracy as a result of occlusion of the posterior cerebellar artery. That is the region which involves as a constant symptom the sensory portion of the fifth nerve. In every case he had been able to find in the literature up to that time, the fifth nerve was involved as the only constant symptom, but there might be other symptoms of involvement. In this case the localization was so limited that the only symptoms he had to go by were the anesthesia of the right side of the face and of the tongue, supplied by the sensory portion of the fifth. In addition to that, the man complained of dizziness; he had a constant tendency to walk to the right and vertigo when he arose to an upright position. The examination was not quite finished, but so far as Dr. Hall could see, the lesion was so extremely localized that the report should be of value as an addition to this line of work.

Dr. I. Leon Meyers understood Dr. Fisher to distinguish two sets of fibers, one for vertigo and one for nystagmus. It might be well to consider in this connection that vertigo, as well as its related phenomena, namely, forced movements, conjugate deviation of the head and eyes, and nystagmus are in reality different manifestations of one and the same disturbance and are unquestionably due to an affection of one and the same set of fibers. What happens is that the patient, as a result of a disturbance in the vestibular system, becomes conscious of moving in a certain direction—e. g., to the right. He may then look to the right by turning his eyes in that direction, thus forming the slow component of nystagmus, or he may look to the right by turning his head as well as his eyes, exhibiting a conjugate deviation of the head and eyes, and in case the disturbance is very profound he may even fall to the right. Vertigo is a minor manifestation of this disturbance. It is merely the sensation of the motor phenomena which exhibit themselves in the nystagmus and its allied symptoms. This sensation may exhibit itself subjectively or objectively, the patient experiencing the sensation of himself moving, or of the objects around him moving.

Dr. Fisher was in accord with the findings of Dr. Wilson regarding the production of the quick component of nystagmus. Dr. Meyers witnessed some experiments at the University of Chicago in which the quick component was observed in rabbits after the entire cerebrum had been removed. Dr. Ivy performed these experiments. He also performed them on dogs, but Dr. Meyers did not see those. From personal observation, having performed a large number of cerebellar operations on animals, he was convinced that nystagmus is not cerebellar in origin. He had succeeded in removing the entire cerebellum without producing nystagmus. Barany's past pointing tests in cerebellar disease, spoken of by Dr. Fisher, he had tested a good many times, but Dr. Meyers was not able to speak as to their value at the present time.

Dr. Austin A. Hayden took occasion to pay his respects to the sincerity and honesty with which Dr. Fisher had proceeded in his investigations. He had had the pleasure of taking his course at the University of Pennsylvania. He wished to make a special plea to the profession and especially to the internists, neurologists and eye, ear, nose and throat men, that they routinely submit more material for neurootologic examination and investigation, following the exact plan worked out by Jones and Fisher. This received wide and just popularity in the ear, nose and throat sections of the various physical examination units of the Aviation Section of the Signal Corps during the late war. The need of a standardized technic—universally recognized and adopted by all men doing this work—is clearly apparent in the statistics quoted by Dr. Gordon Wilson. If this were in use, it would hardly be possible for 24 per cent of any considerable series of cases to show no vertigo.

In the series of 3,748 and over which he reported in detail, June, 1919 (Annals of Otol., Rhinol. and Laryngol.), the percentages were as follows:

Nystagmus.—After rotation to the right there was an aggregate of 82,231 seconds, or an average of 21.9 seconds each. After rotation to the left there was an aggregate of 82,373 seconds, or an average of 21.9 seconds each.

Past Pointing.—After rotation to the right, the right arm past pointed 7,201 times, averaging 1.89 times each, and the left arm past pointd 6,663 times, making an average of 1.77 times each. After rotation to the left, the right arm past pointed 8,029 times, giving an average of 2.14 times each, and the left arm past pointed 7,083 times, averaging 1.88 times each.

Of the 3,748 applicants only 142 were rejected for abnormalities of the kinetic static sense—a little less than 5 per cent; of these, 110 failed in past pointing, 17 in nystagmus, and 7 in falling; 22 men were nauseated and 31 vomited. Disqualification on account of freak causes numbered only 692, or 18.4 per cent.

The common sources of error set forth in the original paper are always to be guarded against.

It was a great source of regret to the men who were doing this work, to Dr. Pierce first of all, and to himself and Dr. Lewy later on, that they were unable to submit all of the rejected men to the caloric tests. The individual findings of the semicircular canal or central nervous system would doubtless have been most interesting to work out.

Dr. Hayden thanked Dr. Fisher for his very interesting presentation of this comparatively new but extremely important subject. He hoped it would be productive of many farreaching results. The most important of these would be a stimulus to more frequent neurootologic examinations.

Dr. Norval H. Pierce expressed his appreciation of Dr. Fisher's having come such a great distance in response to the invitation of the society, and thought he voiced the sentiments of nearly every one as to the great practical value in our everyday work of the knowledge already at our disposal regarding the vestibular apparatus. Owing to the very complicated anatomic factors it would take years before it would be possible to finally place the action of the end organs on a sound foundation. The anatomic space involved in the nerve paths and ganglia is so limited and the centers and tracts so numerous that it is going to be very difficult to differentiate in many cases. For example, the inhibiting mechanism of the vestibular action is not understood. In examining the aviators they saw several cases where profound nystagmus was produced by rotation and the individuals vomited. The very moment the vomiting occurred the nystagmus ceased. Therefore, there is an inhibiting mechanism in this region which inhibits nystagmus, notwithstanding the fact that the lymph is still exerting its action on the end organ. He did not believe this was due to pressure within the endolymph, and secondarily on the perilymph induced by increased abdominal pressure in the act of vomiting. This increases the pressure in the cerebrospinal fluid, it is true, but he had gone over some experiments to eliminate this as a cause of inhibition of nystagmus. It will take a long time and a great many autopsies on cases which have been carefully and accurately studied clinically before the many problems are solved. The matter was not always as plain as the books would indicate. Still, no one can question the great practical value of functional tests of the static apparatus in our everyday clinical work.

Dr. Alfred Lewy said that Dr. Fisher made a reference to a partial paralysis of the soft palate in its failure to lift at its base. Dr. Lewy had seen two instances of this kind in lesions that were supposed to involve the glossopharyngeal nerve. Instead of drawing up quickly the mucous membrane of the posterior wall of the pharynx seemed to draw over to the side, much as the face does in facial paralysis. He asked if Dr. Fisher had ever noticed this condition in angle tumors, especially those that extend down and involve the foramen.

Dr. Lewis Fisher (closing) said that unfortunately there has been a tendency in the last few years to refer to a large phase of this work by the simple term of "past pointing." One is continually asked, "Have you done the past pointing tests; did the patient show past pointing or did he not show past pointing?" This attempt to sum up so comprehensive an examination in so short a phrase is probably due to a haziness of conception of the subject. Any attempt to sum up a vestibular examination in any such manner is like attempting to sum up a neurologic examination in the simple term of "knee jerk." The pointing tests per se, as a matter of fact, do not mean so much. Thus, from the standpoint of clinical diagnosis spontaneous past pointing scarcely means anything at all. Some individuals are naturally inaccurate, and one must not attach too much significanec to the fact that the patient misses the examiner's finger. Furthermore, many patients, even if they did have genuine pathologic spontaneous past pointing as a result of some lesion of the central nervous system, may after a while learn to compensate, and when examined such patients may find the finger accurately.

However, past pointing after stimulation is of greater significance, but after all it is simply an objective expression of the vertigo that is induced and may be easily affected or modified by many conditions, pathologic or otherwise. It is the presence or absence or the character of the induced vertigo that is of importance, and not so much its resulting past pointing. A thing to remember is that "past pointing" after stimulation is really normal pointing for the individual at that time. The stimulation induces a subjective sense of rotation—that is, though sitting absolutely still in a chair he thinks he is turning away from any point he has touched. When he thinks he is turning to the left of the examiner's finger he brings the arm down to the right, or "past points" to the right, and vice versa. To the examiner this appears as "past pointing," but to the patient it is a correct physiologic pointing.

The vertigo that is induced is also a normal physiologic function. It is simply the recording within the brain of the motion sensing that has occurred as a result of the lymph movement within the semicircular canals. The physiology of this method of motion sensing is as follows: When the head is turned to the right, with the head in an upright position, the lymph within the horizontal semicircular canals lags and moves relatively to the left. The individual knows that he has turned to the right; as a result of innumerable repetitions of this same act the brain learns to interpret that whenever the lymph has moved to the left it indicates a body movement to the right and vice versa. Therefore, when the patient is first turned in the chair to the left he says when questioned that he is going to the left; that is not called vertigo, because his statement is in accord with fact. If the turning is repeated fairly rapidly in a smoothly revolving turning chair we reach a point when the lymph within the horizontal canals catches up with the speed of the body and is relatively not moving at all. The patient then will say, if questioned, that he is not moving at all, while, as a matter of fact, he is being rotated rapidly. If then the chair be suddenly stopped the lymph continues to move to the left as the result of the momentum imparted to it by the turning. This lymph movement to the left is immediately interpreted by the brain as body movement to the right, and the patient will say that he is turning to the right when, as a matter of fact, he is sitting absolutely still. Here then we have an instance of information received by the brain along perfectly normal physiologic channels which is not in accord with fact. This "apparently wrong" information is called vertigo. These impulses, started within the ear, naturally traverse definite pathways to the cerebral cortex, where they are received and accurately interpreted.

The nystagmus or eye movement impulses have nothing in common with the vertigo impulses except that for a portion of their course the pathways for these two are within one bundle. While they both start within the ear, one has the eye muscle nuclei as its objective, whereas the other must have the cerebrum as its objective since it results invariably in a definite concise conscious idea. As a result of disease some individuals when stimulated manifest one without the other—something which could not occur if they were both one and the same thing.

Dr. Wilson mentioned that he had never come across a case which would suggest to him that the fibers from the vertical canals have a different course than those from the horizontal canals. Dr. Fisher stated that he had seen a case that very day in Dr. Norcross' office where with a perfectly normal ear no response could be obtained from the vertical semicircular canals, but a very good active response from the horizontal canal was obtained. Evidently the pathways from these two sets of canals must not be together throughout their entire course. When one is very careful with the technic of the douching so that one set of canals alone is stimulated, a number of such instances will be encountered. The observation of Dr. Wilson that in cases of supposed occlusion of the cerebellar arteries one cannot elicit past pointing is in conformity with Dr. Fisher's experience. In these patients there is usually an involvement through a circulatory disturbance of one or more of the cerebellar peduncles. These peduncles carry the fibers concerned in vertigo and past pointing and are probably interfered with by the lesion. The fibers for nystagmus, however, are not interfered with in these cases, further suggesting that these eye movement fibers probably do not go to the cerebellum.

As for the rabbits having no quick component, Dr. Fisher said that while it may be true of rabbits, he did not know how true it was of human beings.

Clinically cerebellar lesions show spontaneous nystagmus. This, however, need not necessarily indicate that such a phenomenon is directly controlled by the cerebellum. The spontaneous nystagmus may be produced in these cases by pressure against the brain stem. Dr. Fisher believed that a lesion limited to the cerebellum and exerting no influence upon the brain stem would probably have no spontaneous nystagmus. From a practical standpoint, however, it matters very little, since most cerebellar lesions do affect the brain stem directly or indirectly and do exhibit spontaneous nystagmus.

Replying to Dr. Pierce, Dr. Fisher said that while it was true that we did not know everything about the vestibular mechanism, and probably never would, there is no reason for being discouraged. There is enough known for a good working basis. No doubt some of the present day ideas will eventually have to be modified, but, on the other hand, conclusions in so many cases that have been studied with the present conception of the vestibular mechanism have been vertified by autopsy or operation that one cannot help but be impressed that we have even today a fairly good working formula. Under no circumstances must it be understood that this type of examination is intended for general neurologic diagnosis. The cases discussed simply illustrated how helpful such an examination could be to the neurologist.

Replying to Dr. Lewy's remarks about involvement of the soft palate, Dr. Fisher stated that he had mentioned this simply as something which at times might be helpful in differentiating between a central and peripheral lesion.

Dr. Fisher thanked the society for the courteous reception extended him.

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